SITE INVESTIGATION

Young Refining Corporation
7982 Huey Road
Douglasville, Douglas County, Georgia

EPA ID# GAD051011344

GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
HAZARDOUS WASTE MANAGEMENT BRANCH

2/9/00

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1. INTRODUCTION

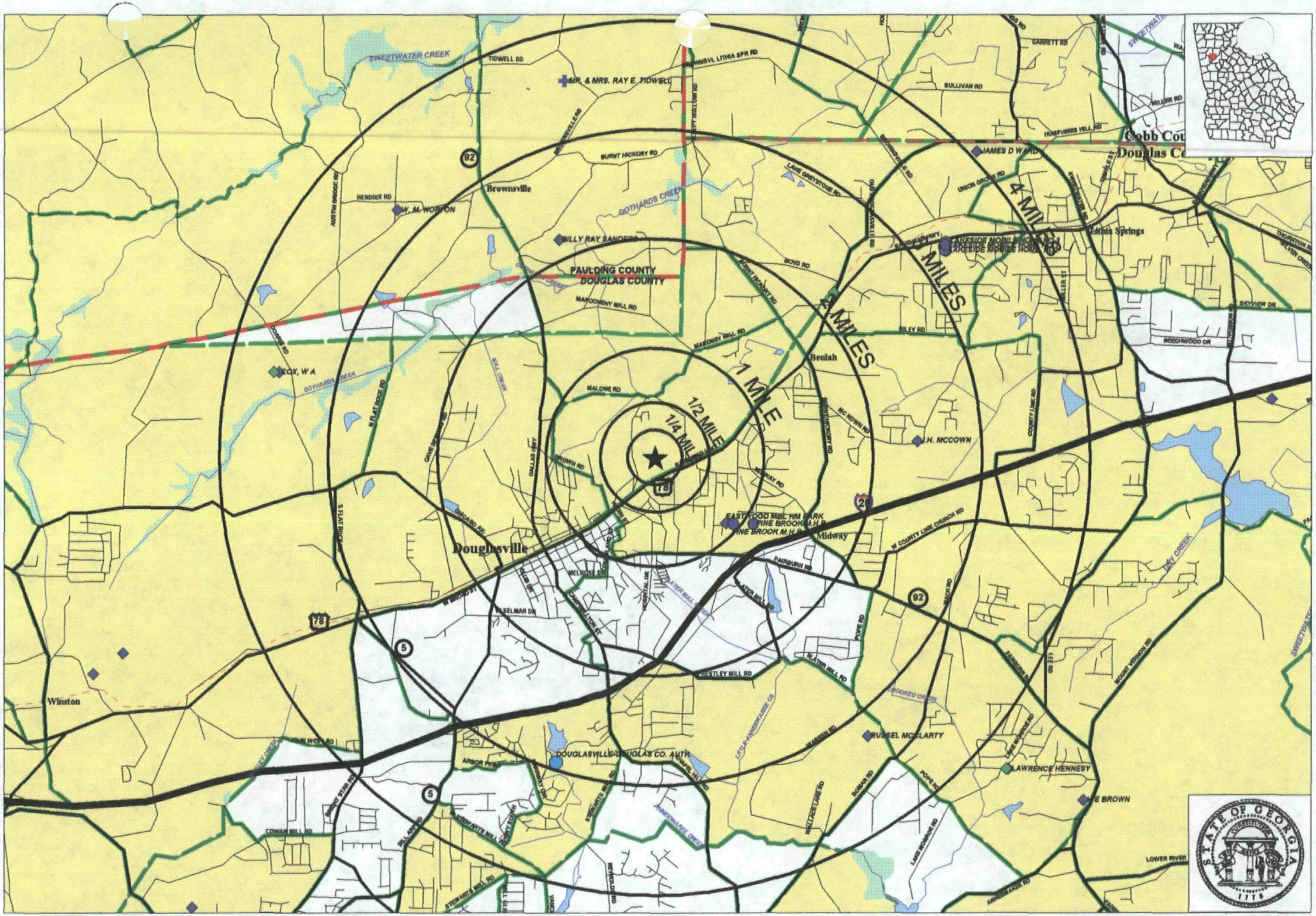
Under authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Hazardous Waste Management Branch of the Georgia Environmental Protection Division (EPD) conducted a site inspection (SI) at Young Refining. The facility is located at 7982 Huey Road, Douglasville, Douglas County, Georgia, 30134, having the assigned EPA ID# GAD051011344. The purpose of this investigation was to collect information concerning conditions at Young Refining sufficient to assess the threat posed to human health and the environment and to determine the need for additional investigation under CERCLA or other authority, and, if appropriate, support site evaluation using the Hazard Ranking System (HRS) for proposal to the National Priorities List (NPL). The evaluation consisted of review of information in the EPD files, including enforcement actions, groundwater reports, a RCRA permit application and Closure Plan and numerous trip reports.

2. SITE DESCRIPTION

2.1 **Location** (Figure 1)

Young Refining is located at 7982 Huey Road, approximately one mile northeast of downtown Douglasville in a mixed use (industrial/residential) area. The site is transected by the boundary between the city of Douglasville and unincorporated Douglas County. The geographic coordinates of Young Refining are 33° 45' 47" North latitude by 84° 43' 53" West longitude. Young Refining is bounded to the south by railroad tracks running parallel to U.S.78, on the west by Central Oil Asphalt, the closed Arivec Chemical facility (a former solvent recycler and fuels blender) and Huey Road, on the northwest by residences, and by cattle land along the north and east property boundaries.(Reference 3) To reach the site, from Atlanta travel west on I-20 to Exit 10, State Route 92. Go right off the exit and travel north on State Route 92 until it dead-ends at the railroad tracks; turn right. Cross over the railroad tracks and turn right (east). This road becomes Huey Road; Young Refining is on the right, marked by a small sign just after Huey Road turns to the north.(Reference 8)

Douglas County has a mild climate with slightly cooler temperatures and a little less rainfall than the state average. The January average temperature is about 44° F and the average temperature in July is about 78° F. Precipitation averages 47 to 48 inches annually, virtually all as rain; mean annual lake evaporation in Douglas County is about 40 inches. There are two peak rainfall periods; late winter and mid-summer.(Reference 3)



Census Block Group with >zero non-public supply well
Census Block Group served by public water
Public Supply Well
Surface Water Intake
Domestic Well
Unused Well
Spring

Industrial Well
Commercial Well
Irrigation Well
Livestock well
Well - Unknown use
Other Well
Other Well - Non Drinking

County Boundary
Road
Major Highway
Stream/River
Railroad
Wetland

3/4/99

YOUNG REFINING
7982 HUEY ROAD
DOUGLASVILLE, DOUGLAS COUNTY

1/4, 1/2, 1, 2, 3 and 4 MILE RADII Well Locations
33 45' 0" LAT / 84 42' 30" LONG

SOURCES: Georgia Public Water Source Inventory, 1994; US Census Bureau 1990; Ga. Water Source Inv., USGS, 1995

Figure 1

2.2 Site Description (Figure 2)

The Young Refining site covers approximately 22 acres, about a third of which is occupied by the tanks and process equipment that comprise the refinery operation. The primary physical feature at Young Refining is the four pond cascade previously used to manage all process wastewater and storm water at the site. Pond number one is the southern-most pond, and is the highest topographically, being about twenty feet above the remaining three ponds. Wastewater and storm water would enter pond one through an API separator, fall twenty feet to pond number two, and then flow through ponds three and four before discharging to Cracker Creek. Cracker Creek is the designated receiving water for Young Refining's NPDES discharge. However, it is not perennial water, as it exists only as a drainage ditch without the discharge from the refinery. The highest ground at the site is along the railroad tracks and loading area to the south. The process areas are about five to ten feet lower in elevation, then the site drops another ten feet to pond number one, with the lowest point on the site more or less corresponding to the NPDES outfall point at the northwest corner of pond number four. The northeastern portion of the site is covered with trees and vegetation and is not used for site operations.(References 3, 8)

2.3 Operational History and Waste Characteristics

Young Refining is a primary refiner of asphaltic crude oil (API Gravity 16-17). Young Refining's primary product is roofing asphalt; they also produce varying amounts of paving asphalt, hydraulic oil base stocks, lubricating oils, heavy #5 oil, naphtha, and some #2 diesel fuel. In the past, Young had produced JP-4 jet fuel and re-refined used oil for use in the onsite boilers; facility representatives have indicated that they no longer do so.(References 3, 4)

The facility was established in 1955 as Cracker Asphalt and was purchased in 1971 by Charles Young Ph.D., who renamed it Young Refining. In the early to mid-1970's, Young Refining was involved in the chemical waste disposal business, and was issued Emergency Order EPD-SWM-17 on March 19, 1976, which required the company to get out of the business. Between 1985 and 1987, Young Refining was inspected pursuant to a complaint about the ponds, issued a notice of violation for placing K051 hazardous waste on the ground next to the API separator, cited by the State Fire Marshal for flammable liquids on the ground and by the Air Protection Branch of EPD for fugitive emissions from the ponds. In 1988, the North Georgia Regional Office of EPD identified groundwater contamination (TCE, BTEX and MIBK) in the vicinity of pond number three and, in 1991, the Hazardous Waste Branch of EPD identified 14 µg/l of benzene at the effluent from pond number four.(Reference 3)

On July 29, 1991, the Hazardous Waste Branch of EPD took samples from the banks of pond number one and water samples from ponds number one, two and four. Results showed that ponds number one and two were managing wastewater with high enough levels of benzene to be classified D018 hazardous waste, and the drop in benzene levels from pond number one to pond number four was indicative of improper treatment of hazardous waste. A consent order, pursuant

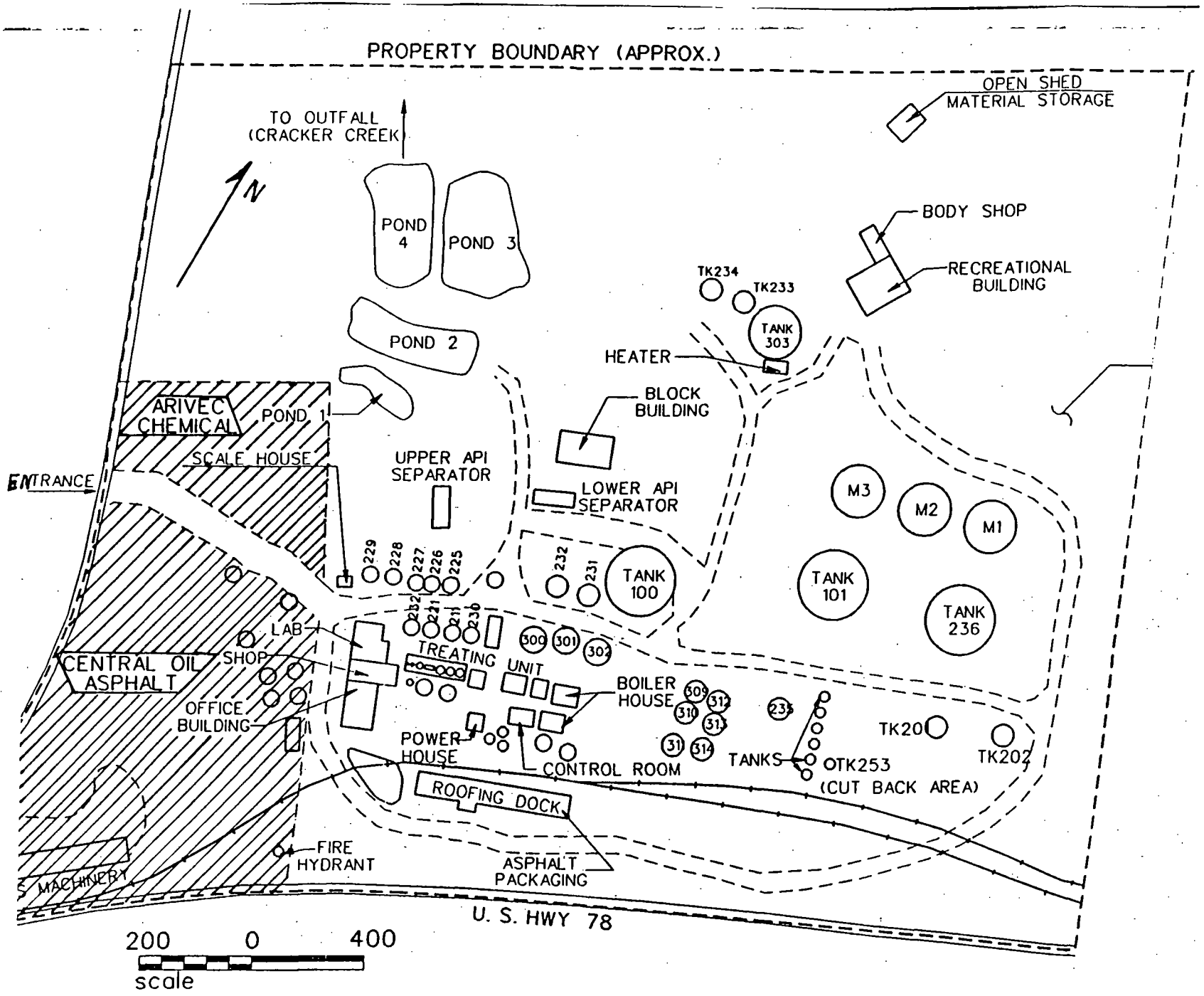

PROPERTY BOUNDARY (APPROX.)
TO OUTFALL (CRACKER CREEK)
N
POND 4
POND 3
POND 2
POND 1
OPEN SHED MATERIAL STORAGE
BODY SHOP
RECREATIONAL BUILDING
TK234
TK233
TANK 303
HEATER
BLOCK BUILDING
ARIVEC CHEMICAL
SCALE HOUSE
ENTRANCE
UPPER API SEPARATOR
LOWER API SEPARATOR
M3
M2
M1
TANK 100
TANK 101
TANK 236
229
228
227
226
225
232
231
LAB
CENTRAL OIL ASPHALT
SHOP
OFFICE BUILDING
TREATING UNIT
300
301
302
BOILER HOUSE
309
310
311
312
313
314
233
TK201
TK202
POWER HOUSE
CONTROL ROOM
TANKS
OTK253
(CUT BACK AREA)
ROOFING DOCK
FIRE HYDRANT
ASPHALT PACKAGING
MACHINERY
U. S. HWY 78
200 0 400
scale

Figure 2

to the Georgia Hazardous Waste Management Act (the equivalent RCRA legislation in Georgia), was proposed in early-1992. In early-1993, the proposed order was amended by including violations of the Air Protection, Water Protection and Solid Waste rules of EPD that were identified during a multi-media inspection in February, 1993. After protracted negotiations and issuance of an administrative order, consent order EPD-HW-1096 was signed on July 8, 1994. The order required immediate compliance with the facility's air permit (2911-048-10645) and NPDES permit (GA0001902) and removal of some accumulations of solid waste at the site. The order also provided for closure of the ponds as a hazardous waste management unit, groundwater evaluation and corrective action, RCRA permitting, payment of a penalty and supplemental environmental projects.(References 3, 9)

On November 2, 1990, USEPA promulgated waste listings for "petroleum refinery primary and secondary (emulsified) oil/water/solids separation sludge(s)...from...separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries"; these wastes were listed F037 and F038, and the listing became effective May 2, 1991. RCRA requires that all land-based units receiving newly-listed hazardous wastes either retrofit to the minimum technical standards in the regulations (40CFR264) or cease receiving hazardous wastes and close within four years of the effective date of the new waste listing. Consequently, Young Refining was issued administrative order number EPD-HW-1163 on April 24, 1995, which required Young to cease discharge of process wastewaters and oily cooling wastewaters to the ponds. Young Refining now manages and treats their process wastewater in tanks and discharges directly to the NPDES outfall through a six-inch PVC pipe.(References 8, 10)

On September 30, 1993, EPD finalized a RCRA Facility Assessment (RFA) that identified 12 Solid Waste Management Units (SWMUs) at the facility; a SWMU "...includes, but is not limited to, any landfill, surface impoundment, waste pile, land treatment unit, incinerator, injection well, tank (including storage, treatment, and accumulation tanks) container storage unit, wastewater treatment unit, including all conveyances and appurtenances used in waste management or storm water handling, elementary neutralization unit, transfer station, or recycling unit from which hazardous waste or hazardous constituents might migrate, irrespective of whether the units were intended for the management of solid and/or hazardous waste." However, most of these SWMUs are impacted by petroleum releases, which are excluded from CERCLA by the definitions of "hazardous substance" [§101(14)] and "pollutant or contaminant" [§101(33)] unless the "petroleum, including crude oil or any fraction thereof...is...otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of this paragraph (14)"; F037 and F038 are both so designated. Consequently, for the purposes of this site investigation, only the ponds and releases from them will be evaluated.(Reference 3)

3. WASTE/SOURCE SAMPLING

3.1 Sample Locations

Hazardous wastes F037 and F038 are listed for benzene, benzo(a)pyrene, chrysene, lead and chromium (40CFR261, Appendix VII). EPD sampled water in ponds number one, two and four, and sediments from the banks of ponds number one and two, in 1991. Further, Young Refining has conducted sampling of pond number three for the purposes of closing its footprint by removal so that it can be used for stormwater management.

3.2 Analytical Results

Samples taken from the banks of pond number one by EPD in 1991 showed the presence of benzene, toluene, ethyl benzene, total xylenes, naphthalene, and 2-methyl naphthalene. Metals identified on the banks of ponds number one and two included silver, barium, cadmium, chromium and lead; these constituents were also identified at the NPDES outfall point. Young Refining sampled the sediment from pond number three in 1998; only lead, chromium and benzene were identified. Levels detected are presented below:

benzene- ND to 1.5 mg/kg
toluene- ND to 3.5 mg/kg
ethyl benzene- ND to 2.3 mg/kg
xylene (total)- ND to 18.6 mg/kg
naphthalene- ND to 10 mg/kg
2-methyl naphthalene- ND to 11 mg/kg
silver- 9.1 to 15 mg/kg
barium- 28 to 76 mg/kg
cadmium- 2.1 to 4.0 mg/kg
chromium- ND to 26 mg/kg
lead- 1.82 to 240 mg/kg

Neither benzo(a)pyrene nor chrysene, constituents for which F037/F038 are listed, have been detected in sediment at the site to date.(References 3, 5, 11)

3.3 Conclusions

The four contiguous ponds at Young Refining have been used for land-based management of F037/F038 listed hazardous wastes since the listing became effective in 1991. Consequently, a release of hazardous waste has been demonstrated at the site; the four contiguous ponds are the source for the purposes of this site investigation.

4. GROUNDWATER PATHWAY

4.1 Hydrogeology

Young Refining is located in the Central Uplands District of the Piedmont Physiographic Province, which is characterized by a series of low linear ridges which range from 1300 to 1500 feet above mean sea level. This area is underlain by metamorphic and igneous rocks which range in age from Precambrian to Paleozoic. Stratigraphy in the vicinity of the site is dominated by the Austell gneiss, tending to biotite gneiss and amphibolite to the north. These belts trend northeast-southwest and include fingers of garnet muscovite schist (north) and the Bill Arp formation (south) of Young Refining. Weathering processes result in an overlying mantle of thoroughly decomposed but in-place rock material called saprolite as well as the development of soil. These materials together are referred to as the regolith. Soil in the vicinity of the site is primarily an Appling sandy clay loam with poor tilth.

Groundwater in this area occurs mainly in the saturated regolith and in discontinuities in the underlying rocks, such as joints, fractures, foliation, and weathered zones. The relatively more permeable regolith serves as a reservoir to trap and channel recharge water into the underlying network of discontinuities in the relatively less permeable bedrock. The orientation of these discontinuities controls groundwater flow directions. Because the regolith and bedrock comprise a single flow system, the "uppermost aquifer" is the only aquifer underlying the site.

Groundwater is typically encountered between 10 and 600 feet below ground surface, and with very few exceptions, is unconfined. Yields for wells tend to be relatively small due to the low permeability of the crystalline rocks and overlying regolith, which limits the rate of recharge. For this reason, groundwater in this area is second to surface water for municipal supply. Well yields are highly dependent on well placement and site specific geology, however, and locally may be sufficient for municipal supply.(References 3, 23)

4.2 Targets

Most residents within four miles of Young Refining obtain their potable water from the Douglasville/Douglas County Water and Sewer Authority. The Authority gets its water from surface water; Anneewakee Creek and the Bear Creek and Dog River reservoirs. Additional water is purchased from the Cobb County-Marietta Water Authority on an as-needed basis. However, the CENTRACTS report indicates that about 1358 people within four miles get their water from wells. Some of these people undoubtedly live in the Eastwood, Pine Brook Estates or Lakeside mobile home parks, although the EPD files refer to a private well on Malone Road about 0.8 miles north of the site.(Reference 3)

4.3 Sample Locations

Young Refining has installed 18 monitoring wells in the vicinity of the source to delineate the extent of groundwater contamination prior to issuance of a RCRA Post-Closure permit; these wells were last sampled in January, 1999. Production wells on-site have also been sampled by EPD in 1987 and 1988, and the residential well referenced above was sampled in 1987. Locations of Young Refining's groundwater monitoring wells are shown on Figure 3.

4.4 Analytical Results

The off-site residential well sampled by EPD in 1987 did not contain any site-related contamination. Results from the Young Refining monitoring wells are summarized on Table 1. (References 3, 6, 7)

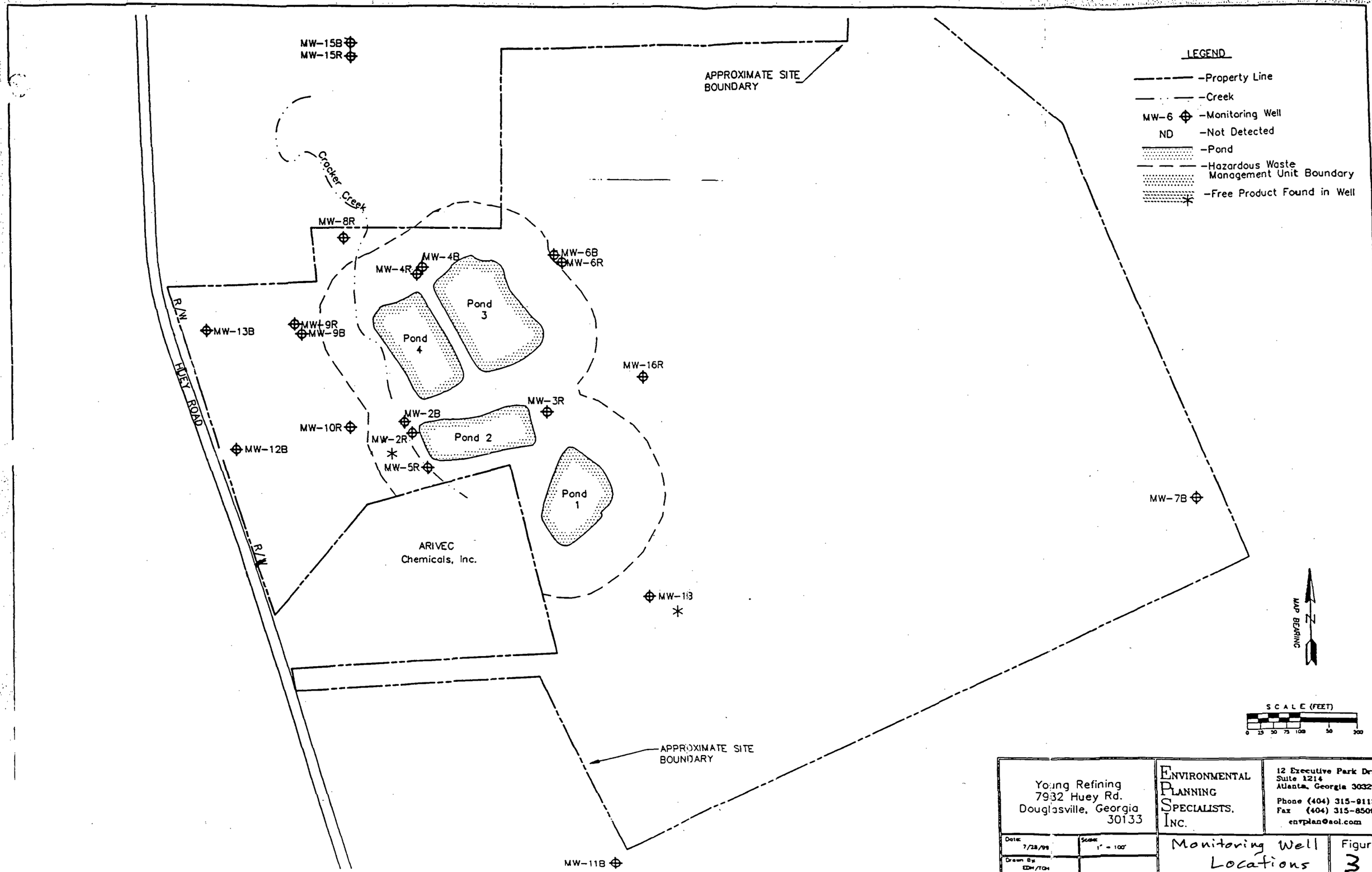
4.5 Conclusions

The source has contaminated groundwater at the site. It is unknown at this time whether or not all constituents are attributable to Young Refining's operations. Discussions with Mr. Jim Young of Young Refining indicated that a solvent recycler adjacent to Young Refining, Arivec Chemicals, used to dump unknown substances into pond number two by way of hoses stretched over the fence. Young Refining subsequently dug a trench on the west side of pond number two to divert any discharge from Arivec away from the ponds and directly to Cracker Creek; this ditch is still visible, although overgrown.(Reference 8) It does not appear as though any potable water wells have been affected by releases from the facility at this time.

5. SURFACE WATER PATHWAY

5.1 Hydrology (Figure 4)

Surface water at Young Refining drains generally from the south side of the site (along the railroad tracks) to the ponds; absent the railroad, site topography slopes from the southeast to the northwest. Cracker Creek starts as a drainage ditch on the Arivec Chemical property, runs north along the west side of pond number two and is fed primarily by the NPDES discharge from Young Refining. Young Refining's discharge is approximately 67,000 gallons per day, exclusive of stormwater flow. Cracker Creek flows north behind 15 houses on the east side of Huey Road for approximately 1/2 mile, then crosses under Huey Road between two houses and discharges to a small pond at the intersection of Huey Road and Malone Road. An un-named creek flows north



Young Refining
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Douglasville, Georgia
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Atlanta, Georgia 30329
Phone (404) 315-9113
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enrplan@aol.com

Date: 7/28/99
Scale: 1" = 100'
Drawn By: EDH/TCH

Monitoring Well Locations

Figure 3

Table 1: Hazardous Constituents in Young Refining's Groundwater		
	lowest detection*	highest detection*
acetone		920
benzene	2	550
methyl ethyl ketone	150	3200
carbon disulfide		33
chlorobenzene	18	59
chloroethane	43	930
chloroform		3
1,2 dichlorobenzene	14	205
1,4 dichlorobenzene	7	24
1,1 dichloroethane	24	1900
1,2 dichloroethane	11	85
1,1 dichloroethene	5	895
cis-1,2 dichloroethene	4	21,300
trans-1,2 dicloroethene	2	14
1,2 dichloropropane	3	50
ethyl benzene	11	156
methyl butyl ketone		25
isopropyl benzene	7	52
methylene chloride	8	121
methyl isobutyl ketone	647	2000
naphthalene	19	73
n-propylbenzene		14
styrene		12
perchloroethene	2	149
toluene	11	13,500
1,1,1 trichloroethane	8	470

Table 1: Hazardous Constituents in Young Refining's Groundwater		
1,1,2 trichloroethane	2	23
trichloroethene	3	602
1,2,4 trimethyl benzene	12	130
1,3,5 trimethyl benzene		42
vinyl chloride	10	3770
total xylenes	19	740
acetophenone	7	50
bis (2-ethylhexyl) phthalate	21	110
m,p cresol		61
2,4 dimethylphenol		61
isophorone	12	34
2-methylnaphthalene	9	22
2-nitrophenol		17
1,2,4 triclorobenzene		167
phenol		75
di-n-octylphthalate		13
barium	20	900
chromium	5	70
lead	9	283
vanadium		30
zinc	20	5100

* all concentrations in ug/l

Single detects are reported in the right-hand column

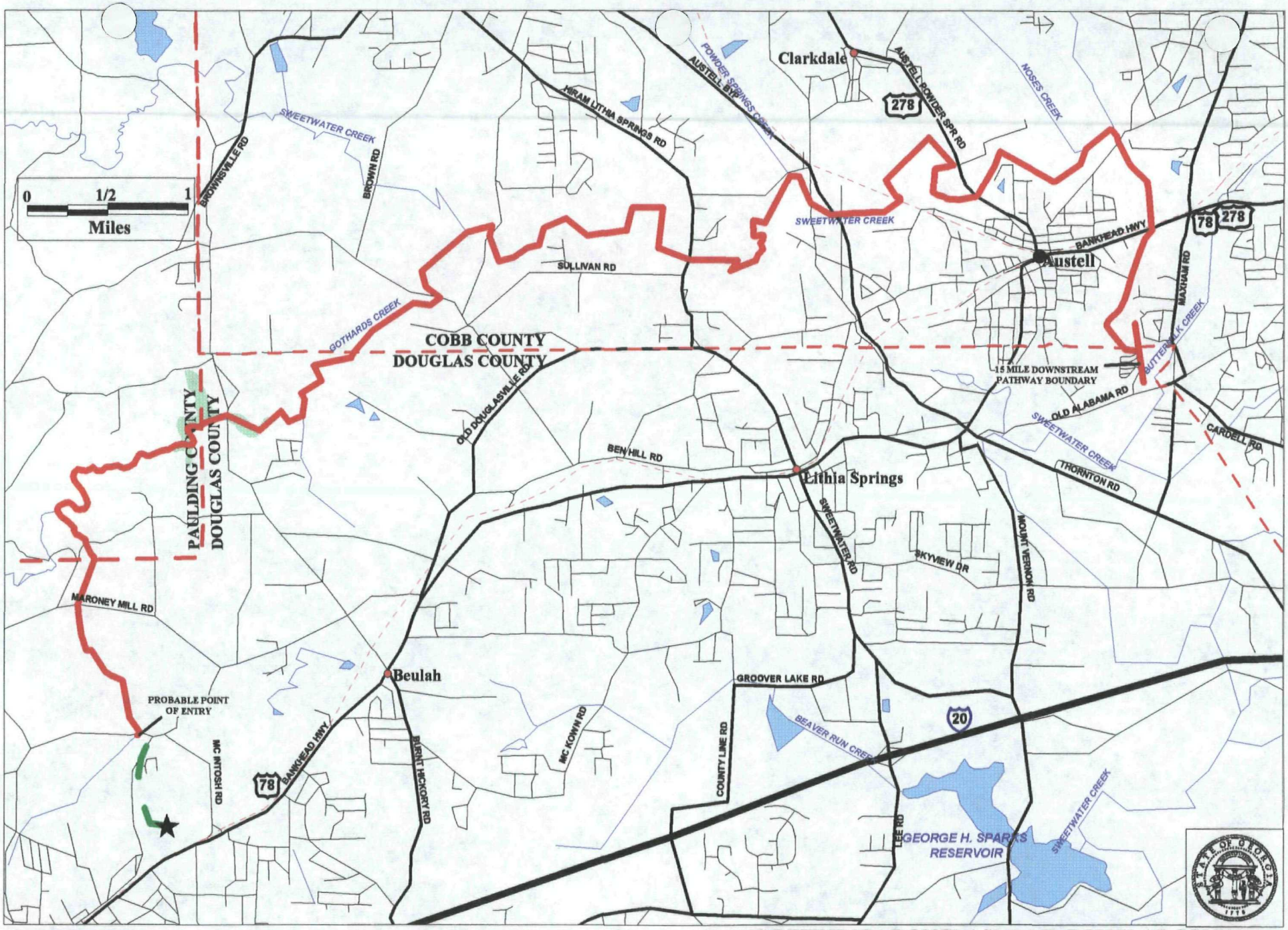
from this pond approximately 1.6 miles to the vicinity of the Douglas County/Paulding County line, where it enters Gothard's Creek. Gothard's Creek enters Sweetwater Creek about six and a third miles from Young Refining. Sweetwater Creek State Park lies approximately 20 miles (in-stream distance) from Young Refining.(References 3, 8, 15, 16)

5.2 Targets

There are no drinking water intakes within 15 in-stream miles of Young Refining. Sweetwater Creek, Gothard's Creek and the un-named tributary are undoubtedly used for recreational fishing, and probably swimming where conditions permit. It is unlikely that any subsistence fishing occurs in these waters. There are numerous wetlands within 15 miles downstream of Young Refining, but none of these have been designated as a critical habitat for endangered species, a state or national park, or otherwise sensitive environment. The Georgia Element Occurrence Records from the Biological and Conservation Database (GA_EORS) record sightings of endangered species by quadrant (NE, NW, SE, SW) of applicable USGS 7.5 minute quadrangle topographic maps. For the 15 mile in-stream distance from Young Refining, this corresponds to the entire Austell quadrangle and the west side of the Mableton quadrangle. The only threatened (state ranking) species sighted in these areas is the Highscale Shiner (*notropis hypsilepis*). However, the Tallapoosa Darter (*etheostoma tallapoosae*) (state ranking- rare) is indicated as being sighted in non-specific portions of Paulding county in the GA_EORS. Both the above species are fish; Table 2 contains a listing of plants designated as being endangered, threatened, rare, or unusual, found in the state of Georgia. This listing is for Douglas, Cobb and Paulding counties, and may include species that are not affected by the site or in the same watershed.(References 3, 13, 14, 15, 16)

5.3 Sample Locations

No samples were taken to evaluate surface water quality pursuant to this site investigation. However, EPD sampled water and sediment at the NPDES outfall in 1991, at the same time as the samples from ponds number one and two were taken. Further, the EPD Toxic Substances Stream Monitoring Project (TSSMP) conducted an evaluation of Cracker Creek (near Malone Road) in 1988, and Young Refining is subject to NPDES permit number GA0001902. Lastly, in 1996, Clayton Environmental sampled the water and sludges in pond number four (from which the NPDES discharge drains) pursuant to an approved RCRA closure plan.



Surface Water Pathway
Hydrology
County Boundary
Projected Surface Pathway
Major Highway
Major Wetland

Site Location
City/Town
Unincorporated Town

YOUNG REFINING - DOUGLASVILLE, DOUGLAS COUNTY
15 MILE SURFACE WATER DOWNSTREAM PATHWAY

Source: 1990 Census Bureau (TIGER), US EPA (GIRAS Landuse), USGS (Wetlands)

Figure 4

Table 2: Endangered, Threatened, Rare or Unusual Plants Potentially Associated with the Young Refining Site			
Name	common name	State status	Federal status
amphianthus pusillus	Little Amphianthus, Pool Sprite, Snorklewort	**Threatened**	**Threatened**
cypripedium acaule	Moccasin Flower, Pink Ladyslipper	**Unusual**	none
cypripedium calceolus	Golden Slipper, Yellow Ladyslipper	**Unusual**	none
draba aprica	Sun-loving Draba, Open-ground draba, Granite Whitlow-grass	**Endangered**	none
hexastylis shuttleworthii var. *harperi*	Harper Wild Ginger, Bog Heartleaf, Callaway Ginger	**Unusual**	none
nestronia umbellula	Indian Olive, Conjurer's Nut, Nestronia	**Threatened**	none
platanthera integrilabia	Monkeyface Orchid, White Fringeless Orchid	**Threatened**	**Candidate**
rhus michauxii	Dwarf Sumac, False Poison Sumac, Michaux Sumac	**Endangered**	**Endangered**
schisandra glabra	Bay Star-vine, Climbing Magnolia, Wild Sarsaparilla	**Threatened**	none
waldesteinia lobata	Piedmont Barren Strawberry	**Threatened**	none

5.4 Analytical Results

Samples of surface water and sediment taken by EPD in 1991 at the NPDES outfall point were non-detect for volatile and semi-volatile organic constituents and showed low levels of barium (76 mg/kg), lead (28 mg/kg), silver (14 mg/kg), chromium (8.3 mg/kg) and cadmium (4 mg/kg) in the sediment only. The TSSMP identified the following compounds in sediment:

chromium - 14 to 23 mg/kg
copper - 3.9 to 12 mg/kg
lead - 3 to 8.1 mg/kg
nickel - 2 to 5.3 mg/kg
zinc - 9.3 to 26 mg/kg
thallium - 26 to 120 mg/kg
trichlorofluoromethane - 3 mg/kg
DDD - 32 µg/kg
DDT - 53 µg/kg

all concentrations are on a dry weight basis. The TSSMP also found the following levels of organics in the surface water:

phenol - 23 to 563 µg/l
benzyl alcohol - 58.5 µg/l
acetone - 180 µg/l
methyl ethyl ketone - 79 µg/l
2-butoxy ethanol - 16 mg/l (est.)

Identified but not quantified were 2-methyl phenol, 1,1-oxy bis(2-ethoxyl)ethane and three ethoxyl and/or butoxy-substituted ethanols. An effluent sample taken at the same time as the surface water and sediment samples shows 88 µg/l of phenol and 260 µg/l of zinc.(Reference 12)

Clayton Environmental identified barium (430 µg/l) and trans-1,2 dichloroethene (6.8 µg/l) in pond number four water, and barium (0.50 ppm), chromium (0.07 ppm), lead (0.1 ppm), trans-1,2 dichloroethene (26 ppb), xylenes (34 ppb), and bis (2-ethylhexyl) phthalate (110 ppm) in sediments.(Reference 5)

Hawley's Condensed Chemical Dictionary indicates that a use for phenol is as a "selective solvent for refining lubricating oils"; further, phenol and acetone may be derived through oxidation of cumene, methyl ethyl ketone and acetone may be derived through oxidation of butane, and methyl ethyl ketone may also be derived through "fermentation". Given that cumene and butane may also be derived from petroleum refining, it is possible that these compounds are present due to Young Refining's operations; it is their standard procedure to operate aeration booms in the ponds.(References 3, 8, 24)

5.5 Conclusions

Releases from the site appear to have impacted surface water and sediment in Cracker Creek. Historical information in EPD's files indicates that the ponds at Young Refining were prone to releases of petroleum during rainfall events. Given that chromium and lead are constituents for

which F037/F038 is listed, and given the presence of zinc in the effluent and possible origins of phenols, methyl ethyl ketone and acetone described above, it is likely that these constituents may have originated at Young. However, given the information about Arivec in 4.5 above, the trichlorofluoromethane, benzyl alcohol and the substituted ethanols likely originated from Arivec, rather than Young.

6. SOIL EXPOSURE AND AIR PATHWAYS

6.1 Physical Conditions

Young Refining is an operational refinery. They are currently conducting a RCRA closure of their hazardous waste management unit (the ponds) pursuant to an approved closure plan. Closure will be by removal and biodegradation of F037/F038 hazardous wastes; the constituents that form the basis for listing the wastes are benzene, benzo(a)pyrene, chrysene, lead and chromium. Due to the on-going nature of the RCRA closure activities, wastes in the hazardous waste management unit are exposed at the time of this writing.(Reference 8)

6.2 Soil and Air Targets

Young Refinery is an active refiner of asphaltic crude oil, employing approximately 46 people. Adjacent to the site are Central Oil Asphalt (3 employees), Dillon Trucking and a machine shop for whom employment information was not available. The CENTRACTS report gives a population of 120 within 1/4 mile and a total of 32,258 people within a four-mile radius of the site. There are several isolated (less than 10 acres) wetlands within two miles of the site; most wetlands beyond this are associated with Gothard's and Sweetwater Creeks along the surface water pathway. No otherwise sensitive environments or critical habitats have been identified within four miles of the site. Endangered, threatened, rare or unusual species that are potentially affected by the site are the same as those listed in section 5.2; none of these species have been observed on the site.(References 3, 15, 16, 17)

6.3 Soil Sample Locations

These are presented in 3.1 above.

6.4 Analytical Results

These are presented in 3.2 above.

6.5 Air Monitoring

There was no air monitoring conducted in conjunction with the preparation of this site investigation.

6.6 Conclusions

The wastes at Young Refining tend to be oily and of low volatility, therefore resistant to transport by air. There are no residents on the site, and less than 100 employees are associated with Young and the three adjacent businesses. Soil on the banks of the ponds is contaminated with F037/F038 hazardous wastes and is currently exposed due to the on-going nature of RCRA closure activities at the site. It should be pointed out here that the 46 Young Refining employees and the three Central Oil Asphalt employees are exposed to the same type of hazardous constituents in the workplace as are present in the source on-site. No release to air is expected from the source, and, although soils are contaminated, their migration is unlikely.

7. SUMMARY AND CONCLUSIONS

Soil and groundwater at Young Refining are contaminated with hazardous constituents above acceptable levels. However, Young is subject to consent order EPD-HW-1096, which requires closure of the four pond hazardous waste management unit and RCRA permitting; the RCRA permit will require post-closure care and corrective action for contaminated groundwater and facility-wide corrective action for SWMUs that are contaminated with hazardous constituents above acceptable risk-based levels. Releases to surface water are monitored by NPDES permit number GA0001902 and air emissions at the facility are regulated under air permit number 2911-048-10645, both of which are issued and administered by GAEPD. There has been no demonstrated impact to potable water wells or sensitive environments by the site. Consequently, it is recommended that remediation at the site be handled pursuant to the State of Georgia's delegated RCRA authority, pursuant to the CERCLA deferral policy.

REFERENCES

1. Hazard Ranking System, 55FR51583 et seq., December 14,1990.

2. Superfund Chemical Data Matrix (SCDM), 1996 edition, for Windows; downloaded from the EPA web page.

3. Young Refining, Inc. RCRA Facility Assessment (RFA), Georgia Environmental Protection Division (GAEPD), Hazardous Waste Management Branch, September 30, 1993.

4. Young Refining Corporation Part B Permit Application for Post-Closure Care of Former Surface Impoundments, February 21, 1997.

5. Young Refining Corporation Closure Plan, Contingent Closure Plan, Contingent Post-Closure Plan, Four Surface Impoundments, May 9, 1996, revised August 19, 1996.

6. Young Refining Corporation Second Quarter 1997 Groundwater Sampling and Assessment, October 29, 1997.

7. Young Refining Corporation Groundwater Quality Assessment, 1st Quarter 1999 Sampling Event, August 28, 1999.

8. Jim McNamara, personal site visits, July 29, 1991, February 2, 1993, March 31, 1995, March 20, 1996, July 29, 1997, September 25, 1998, September 9, 1999, memorialized in trip reports in the GAEPD RCRA files on Young Refining.

9. Consent Order EPD-HW-1096, executed July 8, 1994.

10. Administrative Order EPD-HW-1163, April 27, 1995.

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13. Protected Plants of Georgia, Patrick, Thomas S., Allison, James R., and Krakow, Gregory A., 1995. Georgia Department of Natural Resources, Wildlife Resources Division, Georgia Natural Heritage Program.

14. Georgia Natural Heritage Program, 31 March 1999, Georgia Element Occurrence Records from the Biological and Conservation Database (GA_EORS), Georgia Department of Natural Resources, Social Circle.

15. United States Geologic Survey 7.5 minute quadrangles for Austell (1992), Campbellton (1954, photorevised 1982), Winston (1973, photorevised 1982) and Nebo (1973, photorevised 1982), Georgia.

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20. Climatological Data , Georgia, October, 1995, Volume 099, Number 10, National Oceanic and Atmospheric Administration.

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REFERENCE 3

RCRA FACILITY ASSESSMENT

YOUNG REFINING, INC.
Huey Road
Douglasville, Douglas County, Georgia

EPA I.D. # GAD051011344

GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
HAZARDOUS WASTE MANAGEMENT BRANCH

September 30, 1993

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04

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SUMMARY

Young Refining Corporation is the second owner of an refinery situated on a 22-acre site just north of U.S. Route 78 in Douglasville, Douglas County, Georgia. Young Refining produces three grades of asphalt, two types of oil, #2 diesel fuel and naphtha. Young Refining's process generates a number of listed and characteristic wastes, including K048, K049, K050, K051, F037, F038, and D018. The refinery has been in operation for 38 years, and there have been uncontrolled releases from, and land disposal of wastes in, twelve identified solid waste management units (SWMUs). The nature and extent of release, and wastes involved, is the subject of this report.

This report stipulates that a RCRA Facility Investigation (RFI) will be required for the facility, which investigation will encompass all the SWMUs identified on site.

1.0 INTRODUCTION TO THE RFA PROCESS

The RCRA Facility Assessment (RFA) is a preliminary phase of the RCRA corrective action program. The objective of the program is to clean up releases to the environment of hazardous waste or hazardous constituents. The program applies to all operating, inactive, or closed facilities that treat, store, or dispose of hazardous waste (TSDFs) and which thereby are required to obtain RCRA permits.

Prior to the passage of the 1984 Hazardous and Solid Waste Amendments to RCRA, the Georgia Environmental Protection Division's (EPD) authority to require corrective action for releases of hazardous constituents was limited to releases to groundwater from units that were covered by RCRA permits. Paragraph 391-3-11-.10(2) of the Georgia Rules for Hazardous Waste Management, which incorporates 40 CFR 264 Subpart F, provided the vehicle for requiring corrective action at these "regulated" units. Subsequent to state authorization for the 1984 amendments, EPD's program now extends to releases of hazardous constituents to any media from all units at TSDFs. "Unit" in the present context implies "solid waste management unit" (SWMU), the definition of which includes, but is not limited to, any landfill, surface impoundment, waste pile, land treatment unit, incinerator, injection well, tank (including storage, treatment and accumulation tanks), container storage unit, wastewater treatment unit, including all conveyances and appurtenances used in waste management or stormwater handling, elementary neutralization unit, transfer station, or recycling unit from which hazardous waste, or hazardous constituents might migrate, irrespective of whether the units were intended for the management of solid and/or hazardous waste. The term also applies to areas associated with production processes which have become contaminated as a result of routine, systematic and deliberate releases of wastes or constituents. Atmospheric releases that are covered by an operating permit under Georgia's Air Quality Control Act are excluded. The Georgia Rules for Hazardous Waste Management have been amended by adopting 40 CFR 264.101 which, in part, states that corrective action for releases from SWMUs will be specified in the RCRA permit. The Georgia Hazardous Waste management Act, O.C.G.A. 12-8-60 et seq., independently specifies that any permit "shall contain conditions requiring corrective action for any releases into the environment of hazardous waste or hazardous constituents at the facility seeking a permit, regardless of the time at which waste was placed at such facility" [12-8-66(e)]. The mechanism by which corrective action is specified includes the RFA, for which the present document is the final report.

The RCRA corrective action program for SWMUs consists of three phases:

1. The RCRA Facility Assessment (RFA) to identify releases or potential releases requiring further investigation.

2. The RCRA Facility Investigation (RFI) to fully characterize the extent of identified releases.

3. If required, corrective measures selection and implementation.

During the RFA, EPD investigators compile information on SWMUs and other areas of concern at the facility. Sources of information include inspection reports, permit applications, historical monitoring data, interviews, and aerial photographs. As of June 28, 1988, Paragraph 391-3-11-.11(3)(g) of the Georgia Rules [40 CFR 270.14(d)] requires that a permit applicant itself provide descriptive information on the SWMUs and provide all available information pertaining to any release from the units. EPD evaluates this information to screen from further investigation or action those SWMUs which do not pose a threat to human health or the environment, and to make preliminary determinations regarding releases from the remaining SWMUs, i.e., whether interim corrective measures and/or further investigations are needed. These "further investigations" are handled under the RCRA Facility Investigation (RFI) phase of the program.

2.0 FACILITY DESCRIPTION

2.1 Site Location

Young Refining is located at 7982 Huey Road in Douglasville, Douglas County, Georgia. The site covers about 22 acres, [14] and is bordered on the north and east by cattle land, on the west by Huey Road and Arivec Chemicals, and on the south by railroad tracks running parallel to U.S. Route 78. Specifically, the site is at 33° 45′ 47" North latitude by 84° 43′ 52" West longitude.[17] The property is completely fenced, with trees and upland vegetation on the north, northeast, and east boundaries. The corporate boundary of Douglasville transects the facility in the vicinity of the main east/west site road.

2.2 Nature of Operations

Young Refining is a primary refiner of asphaltic crude oil (API Gravity 16-17). Young produces naptha, #2 diesel fuel, hydraulic oil base stocks, 450 bright stock (heavy #5 oil), paving asphalt, cut-back asphalt and oxidized (roofing) asphalt. Young also re-refines waste oil for use in their on-site burners and used to produce JP-4 jet fuel from their naptha ("field gasoline" @ 60 octane) product stream. Approximately 50% (by volume) of the product stream consists of asphalts, with 26% being #2 diesel, 17.5% being hydraulic oil, and the remainder equally divided between 450 bright stock and naphtha. The maximum capacity at Young Refining is 5,000 barrels per day; normal operational levels are 2,800.[3]

2.2.1 Previous Status

Young Refining was originally established as Cracker Asphalt in 1955. Little is known of operations from this time until 1971 when the facility was purchased by Charles Young, Ph.D., who changed the name to Young Refining. At about this time, Young Refining entered into the hazardous chemical disposal business. In 1976, Young Refining was implicated in the illegal disposal of waste chemicals in an area subsequently referred to as the Basket Creek Road

Disposal Site.[25, 26] Young Refining was subsequently issued Emergency Order number EPD-SWM-17 on March 19, 1976, which order required Young to cease their illegal disposal practices, identify the wastes disposed, and notify the Director of EPD of any future receipt of wastes. This enforcement action forced Young Refining out of the chemical waste disposal business.[28]

Oil/water separation is an integral part of Young Refining's wastewater treatment process and is conducted with a two-cell API separator and a four-pond cascade prior to discharging the wastewater to Cracker Creek. The process is fed by a surface drainage system which conveys stormwater runoff, process wastewater, and spillage (raw material and product) to the API separator. Most oil/water separation occurs in the API unit, but EPD trip reports indicate that a significant amount of oil carries over into the first two ponds of the four-pond system.[2, 5, 6, 22, 29] Consequently, listed wastes F037 and F038 are being generated in the ponds. Periods of heavy rainfall tend to over-tax the system and carry oil over into Cracker Creek.

2.2.2 Current Status

Young Refining no longer manufactures JP-4; aside from that, operations continue as described in 2.2 above. Although Young Refining has notified as a small quantity generator of K048, K050, and K051,[18] conversations with Fang Kuo, Operations Manager, indicate that Young has not generated any hazardous waste in the last five years. Young Refining receives their crude from a terminal in Mississippi by rail, and ships product out by rail or truck. Young Refining currently rents space in tank number 236 to the Inland-Rome Paper Company to store "white liquor" from their pulping process and Farmer's Oil stores waste oil in tank number 221. The far western portion of the site is operated by Central Oil Asphalt, a small (3 employees) manufacturer of emulsified asphalt.[4]

2.3 Site Features

The primary physical feature at Young Refining is the four-pond cascade used for oil/water separation. Pond number 1 is located about 100 feet (depending on water level) from the API separator. Historically, this pond has had upwards of four inches of oil on it, more recent inspections have shown significantly less. The outfall from pond number 1 falls 15-20 feet to pond number 2. There is a movable weir on the east (influent) side of pond number 2 to control any oil that carries over from pond number 1. Ponds number 3 and 4 are on the same level as pond number 2, and Young Refining operates an aeration boom aligned north-south in each pond. The "point source" for Young's NPDES discharge is in the northwest corner of pond number 4.

The relationship of the ponds to Young Refining's process area and tank locations is best shown on the Solid Waste Management Unit (SWMU) location map, Plate 2. This map does not show the railroad spur or the loading dock which form the south border of the facility and separate it from U.S. Route 78.

Terrain at Young Refining slopes gently to the northwest, with the only extreme drop being that from pond number 1 to pond number 2. The foliated areas of the site, to the east, north and northeast, are a mixture of deciduous and evergreens typical of this part of Georgia; heartier weeds grow in the untended areas between the tanks and SWMUs. The berms surrounding ponds number 3 and 4 are grassed and have young deciduous trees (saplings) on them.

3.0 OWNERSHIP AND REGULATORY STATUS

Young Refining is a privately held corporation whose mailing address is:

Young Refining Corporation
Post Office Box 796
Douglasville, GA 30133

The street address is:

7982 Huey Road
Douglasville, GA 30134

Young Refining was a protective filer, submitting a Part A on November 19, 1980. The Part A stated that they generated the following estimated annual waste quantities: 60 kilograms K048, 100 kilograms K049, 50 kilograms K050, and 200 kilograms K051.[18] EPD recommended that Young Refining withdraw their Part A on September 30, 1982, as the quantities of waste generated rendered Young a small quantity generator (SQG) and subject to the 40 CFR 261.5 SQG exemptions;[19] withdrawal was granted on November 03, 1982.[21] Young Refining was inspected by the Generator Compliance Unit of EPD on July 24, 1985 in response to a complaint from Arivec regarding the ponds described above.[22] EPD subsequently issued Young a Notice of Violation for illegal land disposal of K051 on December 09, 1985.[23] In late 1985 or early 1986 Young Refining was issued a citation from the State Fire Marshal's office for flammable liquid on the ground in the central loading area, drainage ditches with product in them and tanks with flammable product on the ground beneath them.

In 1987, Young Refining received a letter from Lou Musgrove of the Air Pollution Prevention Program detailing a number of steps to be taken to reduce fugitive emissions from the facility. Among these items was a requirement to remove all oil from the surface of the ponds.[29] In March of 1988, EPD inspectors responded to an anonymous complaint stating that a large quantity of lead paint was to be sealed up in an out-of-service tank. upon arrival at the site, inspectors discovered a small hole cut in the side of a large, out-of-service tank. Inside were over 250 5-gallon containers of paint with a lead content of approximately 45%; a number of these containers were damaged or rusted through.[6] Young Refining was ordered to properly store the paint and properly dispose of the damaged and leaking containers.

In December 1988, the North Georgia Regional Office of EPD sampled a well in the vicinity of pond number 3.[5] Analysis showed elevated TCE, BTEX and MIBK levels. An analysis of the pond number 4 outfall in February 1991 showed over 14 ppb benzene in the effluent. When Fang Kuo, Operations Manager, was asked if he had tested the influent to the ponds for TC constituents, he said he didn't know what a TC constituent was. The Generator Compliance Unit subsequently referred the facility to the Land Disposal Unit for enforcement action.

On July 29, 1991, EPD inspectors sampled sediment and effluent from ponds number 1, 2, and 4. Subsequent analysis revealed that the water in ponds number 1 and 2 contained a sufficient quantity of benzene to be characterized as D018 hazardous waste.[2] EPD proposed a Consent Order to Young Refining in early 1992 to remedy violations of the Georgia Hazardous Waste Management Act (HWMA), close the ponds, and study and remediate contaminated groundwater at the site. EPD and Young Refining negotiated the Order for almost a year without reaching an agreement. On February 03, 1993, representatives of EPD's Air Protection, Water Protection, and Hazardous Waste Management Branches conducted a multi-media inspection at Young Refining. A summary of violations found includes opacity and record violations (Air); foam, ammonia, inoperable equipment and failure to report (Water); unpermitted treatment and storage, failure to report, failure to submit plans, and failure to classify waste (Hazardous Waste). Young Refining was subsequently issued Administrative Order EPD-HW-1040 on June 23, 1993.[24] Young Refining has appealed the Order; at this writing, the administrative hearings are still pending.

Young Refining is subject to the Interim Status Rules contained in 40 CFR 265. They currently hold Air Quality Permit number 2911-048-10645 and National Pollution Discharge Elimination System (NPDES) Permit number GA0001902. Enforcement actions pursuant to these permits are incorporated into EPD-HW-1040.

4.0 ENVIRONMENTAL SETTING

4.1 Land Use

The Young Refining site is transected (east-west) by the corporate boundary of Douglasville. The portion of the site in Douglasville is zoned light industrial; the remainder of the site is zoned for heavy industry. Young Refining is completely surrounded by residential zoning, with the exception of a section on the south side of U.S. Route 78, near the southwest corner of the facility. This area is zoned commercial along U.S. 78 and heavy industrial south of the commercial zoning. Portions of the south side of U.S. 78 east of the facility are also zoned commercial; the north side of U.S. 78 is zoned light industrial in these areas. A color coded zoning map provided by Douglas County is attached as Plate #3.

4.2 Water Supply

4.2.1 Young Refining

Young Refining uses approximately 2 million galions of water per month (67,000 gpd). Until June of 1993, Young purchased all of their water from the Douglas County Water Authority. In June, Young's purchases from the water authority dropped to about 250,000 gallons per month (8,400 gpd).[16] Details of Young's on-site well are unknown, as wells producing less than 100,000 gpd for industrial purposes do not require permits.

4.2.2 Neighborhood Users

The corporate boundary of Douglasville transects the Young Refining site. Virtually all residences within one-quarter mile of the site obtain their potable water from the Douglas County Water Authority. Douglas County obtains their water from two pre-treatment plants: the Chapel Hill Plant, which draws 1 million gallons per day from Anneewakee Creek and the Bear Creek Plant, which draws 6 million gallons per day from the Bear Creek and Dog River reservoirs. Douglas County also purchases water on an as-needed basis from the Cobb County-Marietta Water Authority.[15]

4.2.3 Wider Area

The CENTRACTS report, generated with 1990 census data, indicates that 1,356 people within four miles of Young Refining get water from drilled or dug wells;[7] most are in the Lakeside and Eastwood Mobile Home Parks.[10]

4.3 Surface Water

Surface water and treated wastewater leave pond number 4 and enter Cracker Creek. Cracker Creek trends north one-half mile until it enters an unnamed tributary of Gothard's Creek. The confluence of this tributary and Gothard's Creek is about 1.6 miles north, just over the Paulding-Douglas County line; Gothard's Creek enters Sweetwater Creek after winding 4.2 miles east-northeast.[17]

4.3.1 Cracker Creek

Cracker Creek is the designated name of the receiving waters for Young Refining's NPDES discharge. Cracker Creek begins as little more than a drainage ditch at the NPDES outfall. It flows north behind 15 houses on the east side of Huey Road, then crosses under the road and flows down a hill between two houses to a small pond. The unnamed tributary to Gothard's Creek extends from this pond to Gothard's Creek in Paulding County.

Young Refining has been cited several times by EPD for oil and foam in Cracker Creek. The most recent incidents were in late February of 1993, when Young discharged so much foam that it was nearly six feet deep on Huey Road where Cracker Creek crosses under it.[24]

4.3.2 Sweetwater Creek

Sweetwater Creek is nearly six and one-third miles downstream of Young's NPDES outfall. It is mentioned here because it is a major recreational and fishing area, and the city of East Point draws its drinking water from Sweetwater Creek.

4.3.3 Flooding

According to National Flood Insurance Program maps of Douglasville (# 130305 0001-0010) and unincorporated Douglas County (# 130306 0010A) Young Refining is not in the 100 or 500 year flood plain.

4.4 Groundwater

Young Refining has no groundwater monitoring wells on site. They have at least one out-of-service well in the vicinity of the ponds, another well was placed in service in June 1993.

4.4.1 Hydrogeology

Young Refining is located in the Central Uplands District of the Piedmont Physiographic Province. Topography in this area consists of low, linear ridges (1,300-1,500 feet above sea level) separated by broad, open valleys.[1]

Groundwater in this area occupies joints, fractures, and other secondary openings in bedrock and pore spaces in the overlying residuum. Recharge is by precipitation that percolates down through these openings and infiltration at outcrops. The unweathered unfractured bedrock has very low porosity and permeability. Hence, groundwater supply depends greatly on the incidence of secondary openings and their interconnection.[12]

The stratigraphy in the vicinity of the site is dominated by the Austell gneiss, tending to biotite gneiss and amphibolite to the north. These belts trend northeast-southwest and include fingers of garnet muscovite schist (north) and the Bill Arp formation (south) of Young Refining.[13] The soil in the vicinity of the site is an Appling sandy clay loam with poor tilth.[1]

4.4.2 Lithology

As there are no monitoring wells on site and all neighborhood users are on city water, site-specific lithological information is not available.

4.5 Climate and Meteorology

Douglas County has a mild climate with slightly cooler temperatures and a little less rainfall than the state average. Average January temperature is about 44° F and the average July temperature is about 78° F. Average annual rainfall is 47 to 48 inches; the mean annual lake evaporation is 40 inches.[1] There are two peak rainfall periods; late winter and mid-summer.[12]

5.0 SOLID WASTE MANAGEMENT UNITS

TABLE 1

Unit ID No.	Name	Releases	Current Use	Follow-up Required
1	Production Area	To soil	Continuous	Investigation, remediation
2	Ponds	To surface water, soil, groundwater	Continuous	Investigation, remediation
3	API Separator	To soil, surface water	Continuous	Investigation, remediation
4	Recreation Building	Suspected to soil, surface water	Continuous	Investigation, remediation
5	Railroad	To soil, surface water	Continuous	Investigation, remediation
6	M-Tank Dump	Suspected to soil, surface water	Continuous	Investigation, remediation
7	Warehouse Area	To soil, surface water	Continuous	Investigation, remediation
8	Tank SWMU #1 Tank SWMU #2 Tank SWMU #3 Tank SWMU #4	To soil, surface water	Continuous	Investigation, remediation
9	Tanker Loading Area	To soil, surface water	Continuous	Investigation, probable remediation
10	East Corner	To soil, surface water	Continuous	Investigation, remediation
11	Abandoned Tanker #1	Suspected to soil, surface water	Continuous	Investigation, probable remediation
	Abandoned Tanker #2	Soil, surface water	Continuous	Investigation, remediation
12	Surface Drainage	Soil, surface water	Continuous	Investigation, remediation

5.1 Individual SWMU Assessments

Unit #1 - Production Area SWMU

The boundaries of this unit are:

North - the east/west site road with the truck scales
South - the site access road running parallel to the railroad
East - the main north/south site road with the Tanker Loading Area SWMU
West - the road running between the Young Refining offices and Central Oil Asphalt

The production area SWMU contains the distillation columns, Merox sweetening unit, both boiler houses, both heaters, the power house, control room, and the combination lab, shop and office building. Photos 1-6 graphically show the condition of this area; unlined ditches and areas between tanks and process equipment, deteriorating secondary containment, and evidence of spills, leaking piping, and leaking tanks. There are also the remains of three dismantled tanks on the east side of the SWMU between tanks number 302(N) and 405(S). Study of an aerial photograph taken by the Department of Transportation on March 05, 1979 shows that there has been little change in this area since then.

Unit #2 - "Ponds" SWMU

This is the four-pond cascade used for wastewater treatment described in 2.2.1 and 2.3 above. As explained in 3.0 above, EPD has analyzed the effluent from ponds number 1, 2 and 4. The results of these analyses, from samples taken July 29, 1991, are presented in tabular form here:

Pond	Benzene	BTEX	Acetone	MEK
1	1100	2333	800	220
2	500	1223	730	270
4	BDL	BDL	BDL	BDL

all results are in µg/l

Analysis of the sediments on the banks of ponds number 1 and 2 and the banks of Cracker Creek downstream of the outfall point showed BTEX in pond number 1 and elevated levels of lead, chromium, and barium in all samples. Young Refining has stated that they periodically dredged ponds number 1 and 2 and deposited the sediments on the shore.

In 1991, the listing rule for oily wastewater sediments became effective. Consequently, Young Refining is generating F037 in ponds number 1 and 2 and F038 in ponds number 3 and 4. Additionally, as described in 3.0 above, it is known that the groundwater under pond number 3 is contaminated. The total area of these ponds is 3-4 acres; their depth depends on weather

conditions but is estimated to be about eight feet. The vegetation (primarily saplings) on the banks of ponds number 3 and 4 is distressed, indicating that the aeration booms are evaporating VOCs from the ponds.

Unit #3 - API Separator

The API separator is a two-cell unit located about 100 feet uphill from pond number 1. Influent to the API separator is from the surface drainage system at the facility; effluent to the pond number 1 is overland. The 1985 notice of violation referenced in 3.0 above was for disposal of K051 (API separator sludge from the petroleum refining industry) on the ground next to the unit. The ground around the unit is covered with oil for about 100 feet in all directions.

Unit #4 - "Recreation Building" SWMU

The "Recreation Building" SWMU is located in the northeast quadrant of the facility, northwest of the building referred to as the "Recreation Building" on the facility map supplied by Young during the 1993 multi-media inspection referenced in 3.0 above. Photos 29 through 34 show conditions in this area. The main feature in this SWMU is a roof structure under which approximately one-third of the waste in this area is stored. The waste ranges from junk trucks to collectable cars, from old furniture to old transformers, from bags of sand and activated carbon to drums full of unknown substances, and from approximately an acre of refinery waste to old motors, pumps, and other facility equipment. This area covers about two and a half acres and, according to the DOT photo referenced in the Unit #1 SWMU description above, was not in existence in March 1979.

Unit #5 - Railroad SWMU

This SWMU consists of the roofing asphalt packaging and loading dock, the associated railroad tracks and the leaking pipe running along the wall and berm separating the railroad from the site access road; U.S. Route 78 forms the southern boundary of this area. Photos 7-9, 13-15, and 19-21 show this area. Roofing asphalt is loaded into the cardboard containers seen in photos number 7 and 8 and is allowed to cool in open air before shipment. There is evidence of significant spillage along the railroad in this area; pictures 13-15 and 19 show the state of repair of the piping running along the railroad tracks. Inspection of the aerial DOT photo shows a large accumulation of solid waste south of the loading dock between it and the main railroad line, which runs parallel to U.S. 78.

Unit #6 - "M-Tank" Dump SWMU

This SWMU is a wooded area north of, and across the road from, tanks number M-1, M-2 and M-3; photo 35 shows a portion of this area. In addition to the drum pile shown in photo 35, there are four out-of-service tanks (not on pads or connected to piping), three out-of service road tankers, and some panels that appear to be old process control equipment in this area. Inspection

of the DOT photo shows four rectangles which are approximately the size of railroad boxcars in a clearing to the north of the trees in this area; there appear to be three out-of service road tankers to the south of this unit, near where tank number M-3 is. The DOT photo shows that the area where M-1, M-2, and M-3 are now was graded in late February to early March of 1979.

Unit #7 - "Warehouse" Area SWMU

The "warehouse" is a concrete block structure with a metal roof and no doors located at the west end of the access road running by tank number 305; the warehouse is about 100 yards ENE of pond number 1. This structure is where the 45% lead paint described in 3.0 above is stored. The remainder of the interior of the building is strewn with small pipe fittings, light fixtures, scrap and other debris. Outside of the structure are several accumulations of waste; there are two piles of miscellaneous debris (tires, etc.) to the east, a large area covered with oil and refinery waste to the north, and about 20 5-gallon cans of the 45% lead paint just outside the east end of the warehouse. There is also a significant quantity of refinery waste along the road leading from the ponds to this area. A review of the DOT photograph shows this area littered with waste and small debris.

Unit #8 - Tank Farm SWMUs (4)

Due to the amount of spillage in the tank farm areas at Young Refining, each one must be considered a SWMU. For convenience, they have been broken down into four separate areas.

1) Tank SWMU #1 - This cluster of tanks is east of the tanker loading area and north of the railroad tracks. It contains tanks numbered 251, 252, and 309 through 314; see photos 10 through 12.

2) Tank SWMU #2 - This cluster of tanks is immediately east of Tank SWMU #1 and contains tanks 235, 253, and the tanks between them. This area is shown in photos number 17, 18, 22 and 23.

3) Tank SWMU #3 - These tanks are north of the Merox unit and Process Area SWMU and south of the API separator. It includes all tanks along the north side of the road between tank number 100 on the east and the scale house on the west.

4) Tank SWMU #4 - This is the cluster of tanks around tank number 303. This area includes a large accumulation of debris and several out-of-service road tankers. EPD inspectors observed a number (over 20) of empty Winchester 12-gauge #8 shot pigeon loads in this area.

Inspection of the DOT photograph shows that the tank farms which comprise Tank SWMUs #1 and 2 did not exist in 1979. There is, however, a significant accumulation of debris west of Tank SWMU #4 and between it and the Warehouse Dump SWMU.

Unit #9 - Tanker Loading Area SWMU

This is the area where road tankers are loaded and was referred to as the "central loading area" by the State Fire Marshal (3.0 above). It is located in the center of the main north-south site road between the Production Area SWMU and Tank SWMU #1.

Unit #10 - "East Corner" SWMU

This area is at the east end of the site road (shown in photo 21) which runs along the railroad tracks, and includes tanks number 201 and 202. There is an accumulation of refinery waste, another of grates which used to cover the surface drainage ditches, and at least one abandoned tanker in this area. The DOT photo shows an accumulation of over a dozen of what appear to be excavated underground storage tanks in this area.

Unit #11 - Abandoned Tanker SWMUs (2)

There are two areas around the ponds where there are or have been large numbers of road tankers abandoned or stored:

1) Abandoned Tanker SWMU #1 - This unit is on the north berm of pond number 3. EPD inspectors observed eight tankers abandoned and pushed into the woods here. The tankers' condition ranged from fair to extensively damaged.

2) Abandoned Tanker SWMU #2 - This unit is the area between pond number 4 westward to the fence along Huey Road. EPD inspectors have observed up to 10 abandoned tankers in this area. There are currently only three tankers here; Will Norton indicated that the others were cut up for scrap. Photo 36 shows a tanker in the process of being cut up; note that there is still "product" in the tanker which is spilling out onto the ground. EPD inspectors observed several like accumulations in this area.

Inspection of the DOT photo shows that Abandoned Tanker SWMU #2 was used for "storage" of a quantity (up to 20) of road tankers and excavated underground storage tanks.

Unit #12 - Surface Drainage SWMU

As mentioned in 2.2.1 above, Young's oil/water separation and wastewater treatment system is fed primarily by a surface drainage system encompassing the entire facility. The vast majority of this system is not lined with anything but hardened, spilled oil. The preamble to the F037/F038 final rule indicates that the waste in these ditches is F037.

6.0 IMPOSITION OF RFI

A RCRA Facility Investigation (RFI) is needed at Young Refining. This determination is based on the following:

1) The areal extent of contamination in the sediment, surface and sub-surface soils at and surrounding each of the SWMUs listed and described in Section 5 is unknown. This data is essential to the proper design and implementation of corrective action at these SWMUs.

2) The groundwater under the site is contaminated with hazardous constituents from SWMUs on-site. There is currently no groundwater monitoring system at the facility.

In conducting the RFI, Young Refining shall develop, for the SWMUs listed in Section 5 where releases have been confirmed, a data base sufficient to allow proper selection of remedial/corrective action from a selection of feasible alternatives. For those SWMUs in Section 5 with suspected or unknown releases, the RFI shall serve to confirm or repudiate the suspected release and estimate the scale of said release.

7.0 SCHEDULE

The schedule for submission of the RFI work plan and RFI reports will be developed and incorporated into an enforcement action at a later date.

REFERENCES

1. Young Refining Corp. Screening Site Inspection (SIC) Report; Gilda Knowles, GAEPD, December 1987.

2. Young Refining Corp. July 29, 1991 Trip Report; Jim McNamara, GAEPD, October 25, 1991.

3. Letter: Charlie Ellis, Young Refining to Jeff Carter, GAEPD Air Pollution Compliance, November 02, 1989.

4. Georgia Manufacturing Directory 1993-94; Georgia Department of Industry, Trade and Tourism.

5. Memo: Roger Denney, GAEPD North Georgia Region, to Randy Williams, GAEPD Land Protection, January 25, 1989.

6. Young Refining Corp. March 14-15, 1988 Trip Report; Jon Olivier, GAEPD, March 23, 1988.

7. CENTRACTS Report, Young Refining Corp.; Frost Associates, Essex, CT.

8. Flood Insurance Rate Map, City of Douglasville, Georgia; Douglas County. National Flood Insurance Program, Federal Emergency Management Agency. Community-Panel Number 130305 0001-0010, Effective Date: June 25, 1982.

9. Flood Insurance Rate Map, Douglas County, Georgia (unincorporated areas). National Flood Insurance Program, U.S. Department of Housing and Urban Development, Federal Insurance Administration. Community Panel Number 130306 0010 A, Effective Date: January 02, 1980.

10. Well Search, Young Refining Corp.; U.S. Geological Survey, Georgia District.

11. Geology and Groundwater Resources of the Atlanta Area, Georgia; Georgia Geological Survey Bulletin Number 55; S. M. Herrick and H. E. LeGrand, 1949.

12. Groundwater in the Greater Atlanta Region, Georgia; Georgia Geologic Survey Information Circular 63; C. W. Cressler, C. J. Thurmond, and W. G. Hester, 1983.

13. Geology of the Greater Atlanta Region; Georgia Geologic Survey Bulletin 96; Keith I. McConnell and Charlotte E. Abrams, 1984.

14. Telephone conversation with Wes Tallon, Douglas County Engineering Department, September 29, 1993.

15. Telephone conversation with Mike Patton, Douglas County Water Authority, September 29, 1993.

16. Telephone conversation with Janet Fonner, Douglas County Water Authority, September 29, 1993.

17. Topographical maps, 1:24,000; Austell, Nebo, Campbellton, Winston (Georgia) Quadrangles. U.S. Geological Survey.

18. Young Refining Corp. Part A, November 19, 1980.

19. Letter: Jennifer Kaduck, GAEPD to Charles Young, Young Refining Corp., September 30, 1982.

20. Letter: Charles Young, Young Refining Corp. to Robert Rose, GAEPD, October 05, 1982.

21. Letter: John Taylor, GAEPD to Charles Young, Young Refining, November 03, 1982.

22. Young Refining Corp. July 24, 1985 Trip Report, Jack Dempsey, GAEPD, November 21, 1985.

23. Letter: Howard Barefoot, GAEPD to Charles Young, Young Refining Corp., December 09, 1985.

24. Administrative Order EPD-HW-1040, June 23, 1993.

25. Memo: Moses McCall, GAEPD, Land Protection to John Taylor, GAEPD, Industrial Solid Waste, may 21, 1976.

26. Basket Creek Road March 18, 1976 Trip Report; Daniel D. Hull, GAEPD, April 06, 1976.

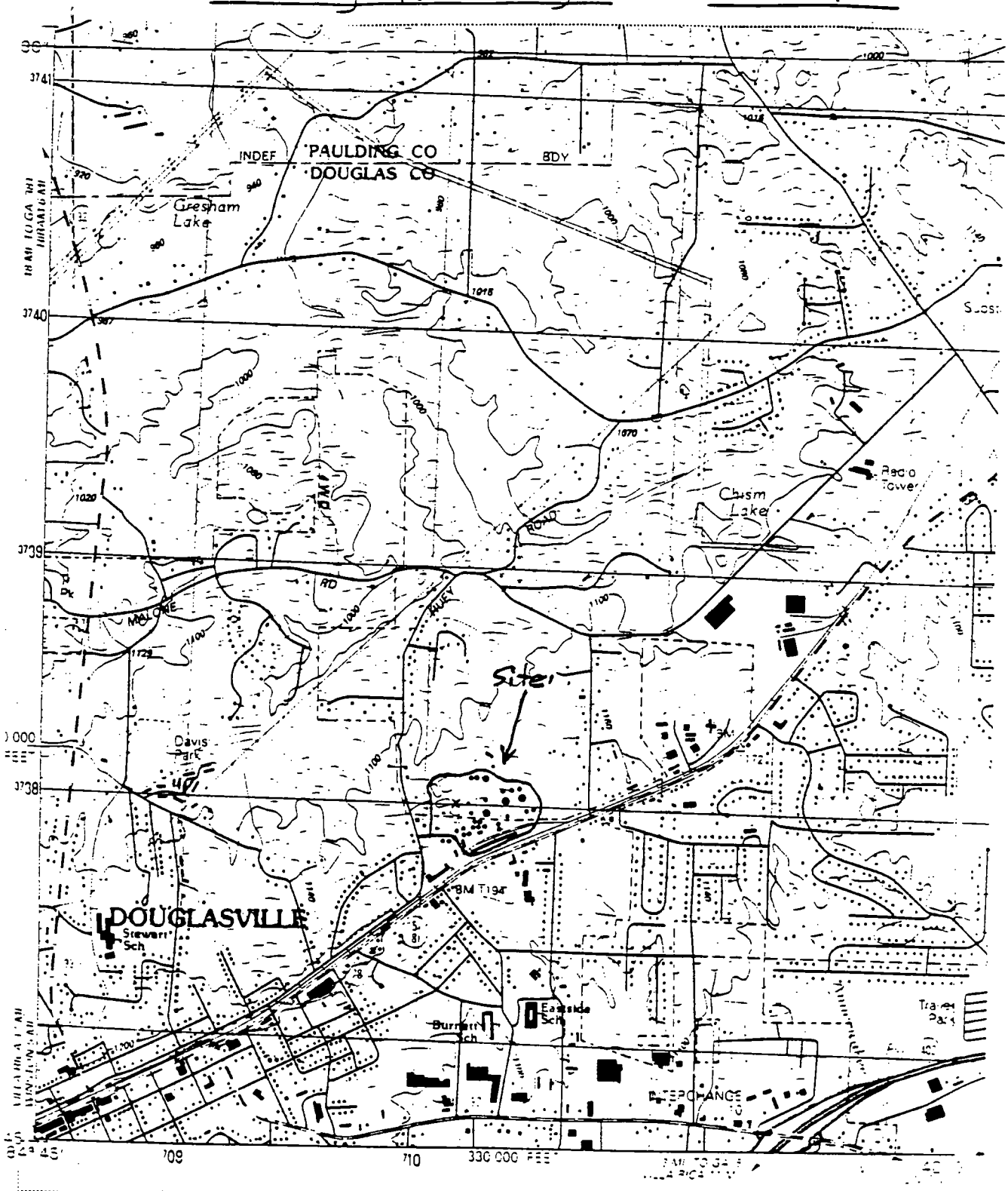
27. Emergency Order EPD-SWM-17, March 19, 1976.

28. Letter; C. B. F. Young, Young Refining Corp., to John Taylor, GAEPD, March 22, 1976.

29. Letter: Lou Musgrove, GAEPD Air Pollution Compliance to Fang Kuo, Young Refining Corp., May 12, 1987.

PLATES

SITE NAME: Young Refining NUMBER: Plate #1



TOPOGRAPHIC MAP QUADRANGLE NAME Austell SCALE: 1:24,000

COORDINATES OF LOWER RIGHT-HAND CORNER OF 2.5-MINUTE GRID

LATITUDE: 33 : 45 0 " LONGITUDE: 84 : 42 30 "

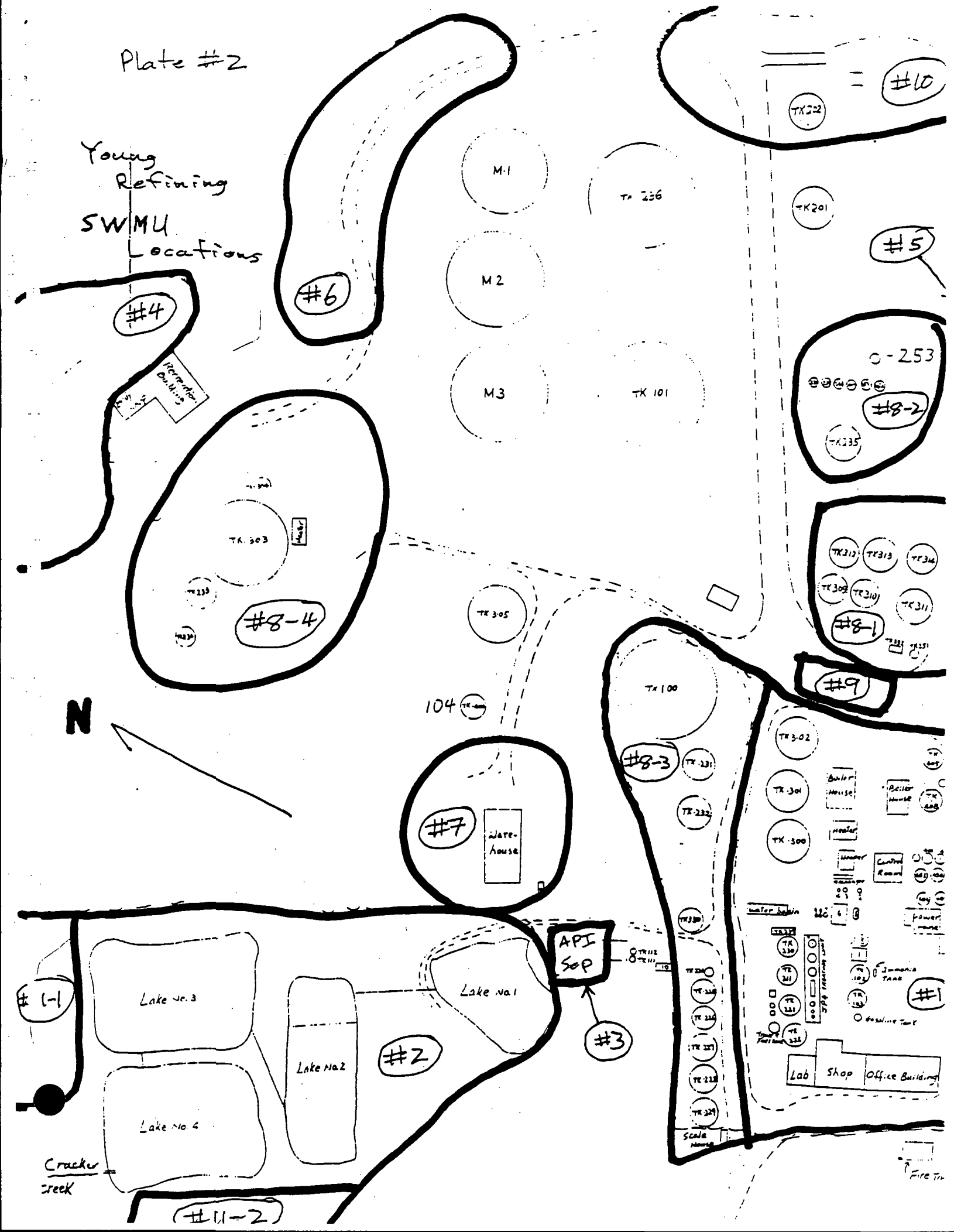


Plate #2
Young Refining
SWMU Locations
#10
#5
#6
#4
#8-2
#8-4
#8-1
#9
#8-3
#7
#1-1
#2
#3
#1
#11-2
N
M-1
M2
M3
TK 236
TK 101
TK 303
TK 305
TK 100
TK 301
TK 300
TK 232
TK 231
TK 235
TK 253
TK 201
TK 222
TK 312
TK 313
TK 346
TK 310
TK 311
104
Warehouse
API Sep
Lake No. 3
Lake No. 1
Lake No. 2
Lake No. 4
Cracker Creek
Lab
Shop
Office Building
Scale House
Boiler House
Control Room
Water Basin
Ammonia Tank
Fire Tr

APPENDICES

LATITUDE AND LONGITUDE CALCULATION WORKSHEET
LI USING ENGINEER'S SCALE (1/60)

SITE NAME: Young Refining CERCLIS #: GAD 051011344

AKA: _____ SSID: _____

ADDRESS: 7982 Huey Rd.

CITY: Douglasville STATE: GA ZIP CODE: 30134

SITE REFERENCE POINT: northern-most point of Pond #1

USGS QUAD MAP NAME: Austell TOWNSHIP: ___ N/S RANGE: ___ E/W

SCALE: 1:24,000 MAP DATE: 1992 SECTION: ____1/4 ____1/4 ____1/4

MAP DATUM: (1927) 1983 (CIRCLE ONE) MERIDIAN: _____

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 84 ° 37 ' 30 " LATITUDE: 33 ° 45 ' 0 "

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 84 ° 42 ' 30 " LATITUDE: 33 ° 45 ' 0 "

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 143

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 47.25 "

C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 0 ' 47.25 "

D) ADD TO STARTING LATITUDE: 33 ° 45 ' 0.0 " + 0 ' 47.25 =

SITE LATITUDE: 33 ° 45 ' 47.25 "

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 249

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

A x 0.3304 = 82.27 "

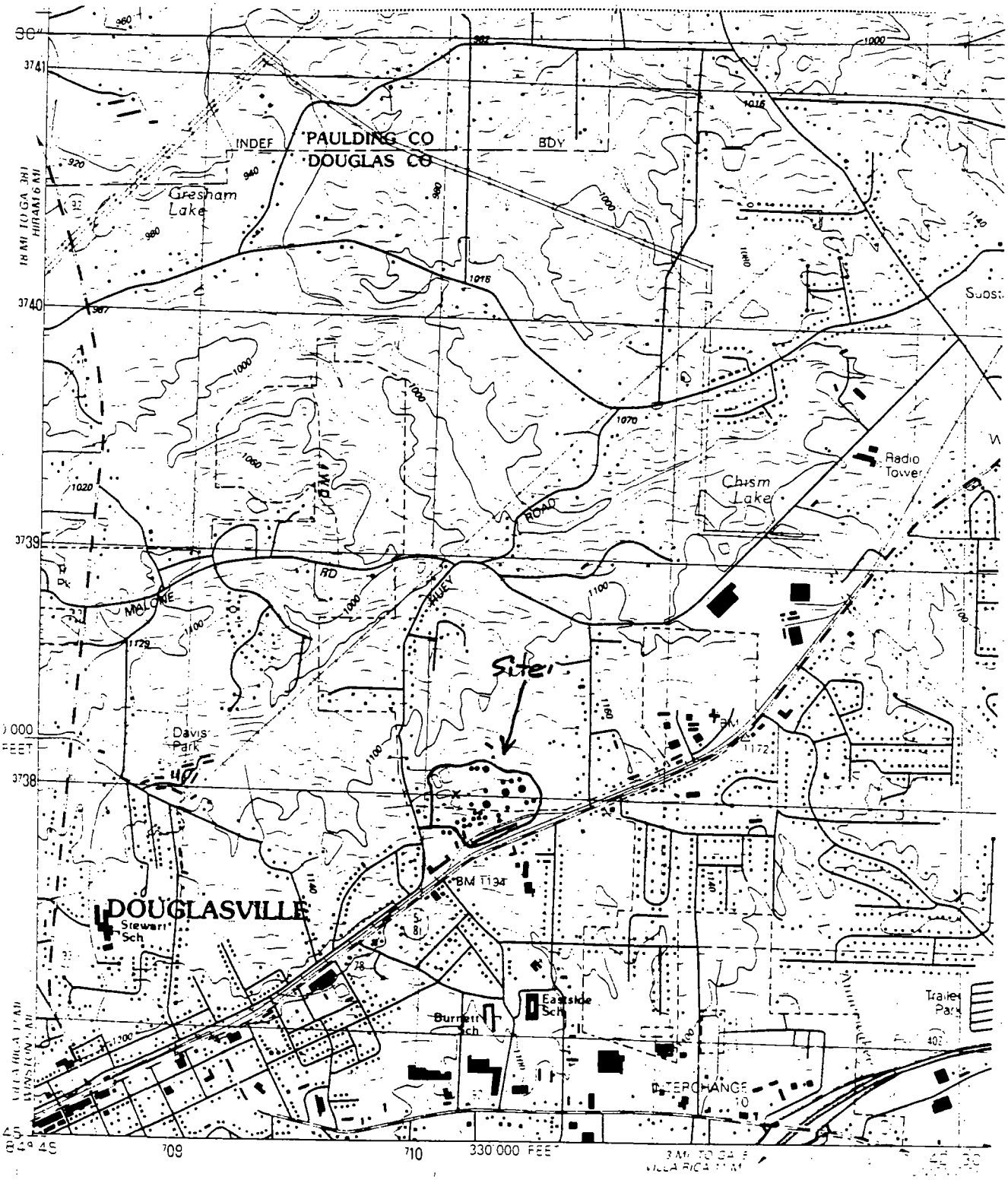
C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 1 ' 22.27 "

D) ADD TO STARTING LONGITUDE: 84 ° 42 ' 30.0 " + 1 ' 22.27 =

SITE LONGITUDE: 84 ° 43 ' 52.27 "

INVESTIGATOR: Jim McNamara DATE: 08/30/93

SITE NAME: Young Refining NUMBER: GAD 051011344



TOPOGRAPHIC MAP QUADRANGLE NAME: Austell SCALE: 1:24,000

COORDINATES OF LOWER RIGHT-HAND CORNER OF 2.5-MINUTE GRID:

LATITUDE: 33 : 45 : 0 " LONGITUDE: 84 : 42 : 30 "

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
DOUGLASVILLE,
GEORGIA
DOUGLAS COUNTY

PANELS 5,10

MAP INDEX

ALL PANELS PRINTED

COMMUNITY-PANEL NUMBER
130305 0001-0010

EFFECTIVE DATE:

JUNE 25, 1982

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

DOUGLAS COUNTY, GEORGIA
(UNINCORPORATED AREAS)

PANEL 10 OF 65

COMMUNITY-PANEL NUMBER
130306 0010 A

EFFECTIVE DATE:
JANUARY 2, 1980

U.S. DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

FROST ASSOCIATES

P.O. Box 495, Essex, Connecticut 06426
(203) 767-7644 Fax (203) 767-7069

Sep 9, 1993

To: James Ussery
Department of Natural Resources
Environmental Protection Division
106 Butler Street SE
Atlanta, GA 30334

Fr: Bob Frost
Frost Associates
P.O. Box 495
Essex, CT 06426

Tel: (203) 767-1254
Fax: (203) 767-7069

Sub: Young Refining
Douglas County, Ga

Site Longitude: 84.731194
Site Latitude : 33.763130

The CENTRACTS report below identifies the population, households, and private water wells of each Block Group that lies within, or partially within, the 4, 3, 2, 1, .5, and .25, mile "rings" of the latitude and longitude coordinates above. CENTRACTS may have up to ten radii of any length. 1000 block groups, and 15000 block group sides.

TRACTS uses the 1990 Block Group population and Block Group house count data found ... the Census Bureau's 1990 STF-1A files. The sources of water supply data are from the Bureau's 1990 STF-3A files. The boundary line coordinates of the Block Groups were extracted from the Census Bureau's 1990 TIGER/Line Files.

CENTRACTS reports are created with programs written by Frost Associates, P.O. Box 495, Essex, Conn. The code was written using Microsoft's Quick-Basic Ver. 4.5.

Latitude and Longitude coordinates identifying a site are entered in degrees and decimal degrees. One or more county files holding Block Group boundary lines are selected for use by CENTRACTS by determining whether the site coordinates fall within the minimum and maximum Lat\Lon coordinates of each county in the state.

Each Block Group line segment has Lat\Lon coordinates representing the "From" and "To" ends of that line. All coordinates from the selected county files are read and converted from degrees, decimal degrees to X\Y miles from the site location. Each line segment is then examined whether it lies within or partially within the maximum ring from the site.

The unique Block Group ID numbers of each line segment that lie within the maximum ring are retained. All Block Group boundary lines matching the Block Group numbers are then extracted from the respective county files to obtain all sides of the in cluded Block Groups. Boundary records are then sorted in adjacent side order to determine the shape and area of each Block Group polygon.

A method to solve for the area of a polygon is to take one-half the sum of the pro ducts obtained by multiplying each X-coordinate by the difference between the adja cent Y-coordinates. For a polygon with coordinates at adjacent angles A, B, C, D, and

E. The formula can be expressed:

Area = 1/2{Xa(Ye-Yb)+ Xb(Ya-Yb)+ Xc(Yb-Yd)+ Xd(Yc-Ye)+ Xe(Yd-Ya)}

For each ring, the selected Block Groups will be inside, outside, or intersected by the ring. When a polygon is intersected, the partial Block Group area within that ring is calculated using the method described below.

When a ring intersects a Block Group, the intersect points are solved and plotted at the points where the ring enters and exits the shape. The chord line, a line within the circle connecting the intersect points is determined. This chord line is used to calculate the segment area, the half moon shape between the chord line and the ring, and the sub-polygon created by the chord line and the Block Group boundaries that lie outside the ring.

The segment area is subtracted from the sub-polygon area to determine the area of the sub-polygon outside the ring. The area outside the ring is then subtracted from the area of the entire polygon to arrive at the inside area. This inside area is then divided by the tract's total area to determine the percentage of area within the ring. This process is repeated for each block group that is intersected by one of the rings. The total area, partial area, and percentage of partial area of those block groups within, or partially within a ring, are held in memory for the report.

On occasion, the algorithm described above is unable to determine the area of the partial area. Within the report program is a "Paint" routine which allows an enclosed shape to be highlighted. Another routine calculates the percentage of highlighted
een pixels to the pixels within the polygon. A manual entry is allowed. Both the
int" method and manual entry method over ride the calculated method.

CENTRACTS lists, starting on page 4, all Block Groups in State, County, Census Tract, and Block Group ID order that lie within, or partially within, the maximum ring. Each Block Group is identified by a City or Town name and by the Block Group's State, County, Tract and Block Group ID number. Following is the Block Group's 1990 populu tion and house count extracted from the Census Bureau's 1990 STF-1A files.

The next four columns display water source data from the 1990 STF-3A files. The first column is "Units with Public system or private company source of water", followed by "Units with individual well, Drilled, source of water"; "Units with individual well, Dug, source of water" and "Units with Other source of water".

For each ring, CENTRACTS then shows the Block Groups that are within that ring, the Block Group's total area in square miles, the partial area of the Block Group within that ring, and the partial percentage within the ring. The areas of the included Block Group and the partial areas are then totaled.

The last section tallies the demographic data within each ring. The percentage of area for each Block Group is multiplied times the census data for that Block Group and totaled for all Block Group's within the ring. Ring totals are then determined by subtracting the three mile data from the four mile, the two mile from the three mile, one from the two, etc... Population on private wells is calculated using the formula: ((Drilled + Dug Wells) / Households) * Population

Young Refining
Douglas County, GA

No.	City	Block Group ID	Blk Grp People	House Holds	Public Water	Drilled Wells	Dug Wells	Other
1	Austell	13067 0314987	1209	418	410	18	0	0
2	Powder Springs	13067 0315014	1268	453	419	8	0	0
3	Powder Springs	13067 0315015	869	303	287	18	0	0
4	Powder Springs	13067 0315016	707	247	233	7	0	0
5	Lithia	13097 0802 1	603	218	176	7	8	0
6	Lithia	13097 0802 2	2205	827	754	97	10	0
7	Lithia	13097 0802 3	2231	885	876	13	6	0
8	Lithia	13097 0802 4	1704	597	586	8	0	0
9	Lithia	13097 0802 5	3831	1341	1274	16	15	0
10	Lithia	13097 0803 1	426	151	112	22	0	0
11	Lithia	13097 0803 2	2881	1070	948	42	7	7
12	Lithia	13097 0803 3	2640	952	968	0	0	0
13	Lithia	13097 0803 4	1055	348	323	4	0	0
14	Lithia	13097 0803 5	2985	1150	1095	54	0	37
15	Lithia	13097 0803 6	1698	899	927	0	0	0
16	Lithia	13097 0803 7	24	12	11	0	0	0
17	Winston	13097 0804 1	2065	746	594	69	84	0
18	Bill Arp	13097 0805011	2072	716	704	0	0	0
19	Bill Arp	13097 0805031	1405	448	432	0	0	0
20	Bill Arp	13097 0805032	526	182	199	0	0	0
21	Bill Arp	13097 0805033	430	143	131	0	0	0
22	Bill Arp	13097 0805034	1251	633	619	17	0	5
23	Bill Arp	13097 0805035	1164	571	586	0	0	0
24	Bill Arp	13097 0805036	1907	711	704	0	0	8
25	Bill Arp	13097 0805037	358	121	125	0	0	0
26	Bill Arp	13097 0805038	132	44	53	0	0	0
27	Bill Arp	13097 0805044	2021	685	568	140	19	0
28	Lithia	13097 0806011	1260	434	394	16	0	0
29	Lithia	13097 0806012	2817	942	894	26	0	0
30	Lithia	13097 0806013	1268	577	584	0	0	0
31	Lithia	13097 0806016	981	312	304	0	0	0
32	Lithia	13097 0806022	2248	809	789	55	0	0
33	Winston	13097 0807982	56	22	18	10	0	0
34	Winston	13097 0807984	78	33	25	0	0	0
35	Hiram	13223 1206982	1323	478	341	60	34	0
36	Hiram	13223 1206984	661	261	145	111	18	0
	Totals:		50359	18739	17608	818	201	57

Young Refining
Douglas County, GA

City	Census Tract ID	Tract People	House Count	Public Water	Drilled Wells	Dug Wells	Other Wells
Austell	13067 0314987	1209	418	410	18	0	0
	Sub Totals:	1209	418	410	18	0	0
Bill Arp	13097 0805032	526	182	199	0	0	0
Bill Arp	13097 0805033	430	143	131	0	0	0
Bill Arp	13097 0805034	1251	633	619	17	0	5
Bill Arp	13097 0805035	1164	571	586	0	0	0
Bill Arp	13097 0805036	1907	711	704	0	0	8
Bill Arp	13097 0805037	358	121	125	0	0	0
Bill Arp	13097 0805038	132	44	53	0	0	0
Bill Arp	13097 0805044	2021	685	568	140	19	0
Bill Arp	13097 0805031	1405	448	432	0	0	0
Bill Arp	13097 0805011	2072	716	704	0	0	0
	Sub Totals:	11266	4254	4121	157	19	13
Hiram	13223 1206984	661	261	145	111	18	0
Hiram	13223 1206982	1323	478	341	60	34	0
	Sub Totals:	1984	739	486	171	52	0
Lithia	13097 0803 3	2640	952	968	0	0	0
hia	13097 0803 2	2881	1070	948	42	7	7
chia	13097 0803 7	24	12	11	0	0	0
Lithia	13097 0803 4	1055	348	323	4	0	0
Lithia	13097 0803 5	2985	1150	1095	54	0	37
Lithia	13097 0803 6	1698	899	927	0	0	0
Lithia	13097 0806012	2817	942	894	26	0	0
Lithia	13097 0806013	1268	577	584	0	0	0
Lithia	13097 0806016	981	312	304	0	0	0
Lithia	13097 0803 1	426	151	112	22	0	0
Lithia	13097 0802 2	2205	827	754	97	10	0
Lithia	13097 0802 3	2231	885	876	13	6	0
Lithia	13097 0802 4	1704	597	586	8	0	0
Lithia	13097 0802 1	603	218	176	7	8	0
Lithia	13097 0806011	1260	434	394	16	0	0
Lithia	13097 0806022	2248	809	789	55	0	0
Lithia	13097 0802 5	3831	1341	1274	16	15	0
	Sub Totals:	30857	11524	11015	360	46	44
Powder Springs	13067 0315014	1268	453	419	8	0	0
Powder Springs	13067 0315016	707	247	233	7	0	0
Powder Springs	13067 0315015	869	303	287	18	0	0
	Sub Totals:	2844	1003	939	33	0	0
Winston	13097 0807982	56	22	18	10	0	0
Winston	13097 0804 1	2065	746	594	69	84	0
Winston	13097 0807984	78	33	25	0	0	0

Young Refining
Douglas County, GA

Sub Totals:	2199	801	637	79	84	0

Young Refining
Douglas County, GA

For Radius of 4 Mi., Circle Area = 50.265482

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
1	Austell	13067 314987	2.996827	0.172246	5.75
2	Powder Springs	13067 315014	2.134539	0.020773	0.97
3	Powder Springs	13067 315015	2.527893	1.197903	47.39
4	Powder Springs	13067 315016	1.521865	0.232206	15.26
5	Lithia	13097 8021	2.326935	2.326935	100.00
6	Lithia	13097 8022	2.230593	2.135456	95.73
7	Lithia	13097 8023	2.554043	1.108818	43.41
8	Lithia	13097 8024	2.790677	2.790677	100.00
9	Lithia	13097 8025	3.349018	2.683551	80.13
10	Lithia	13097 8031	1.295342	1.295342	100.00
11	Lithia	13097 8032	4.278533	4.278533	100.00
12	Lithia	13097 8033	2.432825	2.432825	100.00
13	Hiram	13223 1206984	6.865861	3.467422	50.50
14	Lithia	13097 8035	1.905459	1.905459	100.00
15	Lithia	13097 8036	1.076736	1.076736	100.00
16	Lithia	13097 8037	0.540493	0.540493	100.00
17	Winston	13097 8041	12.918985	4.192340	32.45
18	Bill Arp	13097 805011	2.020361	0.577936	28.61
19	Bill Arp	13097 805031	1.659910	0.717418	43.22
20	Bill Arp	13097 805032	0.367678	0.022952	6.24
21	Bill Arp	13097 805033	0.200265	0.000284	0.14
22	Bill Arp	13097 805034	0.703736	0.283161	40.24
23	Bill Arp	13097 805035	0.472620	0.472620	100.00
24	Bill Arp	13097 805036	1.335251	1.335251	100.00
25	Bill Arp	13097 805037	0.588223	0.588223	100.00
26	Bill Arp	13097 805038	0.545371	0.369258	67.71
27	Bill Arp	13097 805044	6.340019	0.026290	0.41
28	Lithia	13097 806011	2.932541	2.932541	100.00
29	Lithia	13097 806012	3.141858	1.699059	54.08
30	Lithia	13097 806013	1.698368	1.698368	100.00
31	Lithia	13097 806016	1.454306	0.381476	26.23
32	Lithia	13097 806022	2.027714	0.069911	3.45
33	Winston	13097 807982	0.677052	0.677052	100.00
34	Winston	13097 807984	0.954629	0.918395	96.20
35	Hiram	13223 1206982	7.442923	3.972827	53.38
36	Lithia	13097 8034	1.725901	1.725901	100.00
	Totals:		90.035362	50.326645	

For Radius of 3 Mi., Circle Area = 28.274334

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
3	Powder Springs	13067 315015	2.527893	0.003751	0.15

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
5	Lithia	13097 8021	2.326935	1.773267	76.21
6	Lithia	13097 8022	2.230593	0.757468	33.96
8	Lithia	13097 8024	2.790677	2.195916	78.69
9	Lithia	13097 8025	3.349018	1.012186	30.22
10	Lithia	13097 8031	1.295342	1.295342	100.00
11	Lithia	13097 8032	4.278533	4.277973	99.99
12	Lithia	13097 8033	2.432825	2.351250	96.65
13	Hiram	13223 1206984	6.865861	0.874984	12.74
14	Lithia	13097 8035	1.905459	1.905459	100.00
15	Lithia	13097 8036	1.076736	1.076736	100.00
16	Lithia	13097 8037	0.540493	0.037990	7.03
17	Winston	13097 8041	12.918985	0.703666	5.45
18	Bill Arp	13097 805011	2.020361	0.000065	0.00
23	Bill Arp	13097 805035	0.472620	0.003208	0.68
24	Bill Arp	13097 805036	1.335251	0.734256	54.99
25	Bill Arp	13097 805037	0.588223	0.169154	28.76
28	Lithia	13097 806011	2.932541	1.791283	61.08
29	Lithia	13097 806012	3.141858	0.414505	13.19
30	Lithia	13097 806013	1.698368	1.698368	100.00
33	Winston	13097 807982	0.677052	0.677052	100.00
34	Winston	13097 807984	0.954629	0.705236	73.88
35	Hiram	13223 1206982	7.442923	2.044152	27.46
36	Lithia	13097 8034	1.725901	1.725901	100.00
	Totals:		67.529076	28.229166	

For Radius of 2 Mi., Circle Area = 12.566371

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
5	Lithia	13097 8021	2.326935	0.134613	5.78
6	Lithia	13097 8022	2.230593	0.040254	1.80
8	Lithia	13097 8024	2.790677	0.649902	23.29
9	Lithia	13097 8025	3.349018	0.082596	2.47
10	Lithia	13097 8031	1.295342	1.282173	98.98
11	Lithia	13097 8032	4.278533	2.444883	57.14
12	Lithia	13097 8033	2.432825	0.920107	37.82
14	Lithia	13097 8035	1.905459	1.905459	100.00
15	Lithia	13097 8036	1.076736	1.063734	98.79
28	Lithia	13097 806011	2.932541	0.059844	2.04
30	Lithia	13097 806013	1.698368	1.047256	61.66
33	Winston	13097 807982	0.677052	0.676843	99.97
34	Winston	13097 807984	0.954629	0.200545	21.01
35	Hiram	13223 1206982	7.442923	0.325511	4.37
36	Lithia	13097 8034	1.725901	1.725901	100.00
	Totals:		37.117535	12.559620	

For Radius of 1 Mi., Circle Area = 3.141593

Young Refining
Douglas County, GA

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
10	Lithia	13097 8031	1.295342	0.335507	25.90
11	Lithia	13097 8032	4.278533	0.340547	7.96
12	Lithia	13097 8033	2.432825	0.115909	4.76
14	Lithia	13097 8035	1.905459	0.929790	48.80
15	Lithia	13097 8036	1.076736	0.097263	9.03
36	Lithia	13097 8034	1.725901	1.322576	76.63
	Totals:		12.714796	3.141593	

For Radius of .5 Mi., Circle Area = 0.785398

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
14	Lithia	13097 8035	1.905459	0.189517	9.95
36	Lithia	13097 8034	1.725901	0.595881	34.53
	Totals:		3.631360	0.785398	

For Radius of .25 Mi., Circle Area = 0.196350

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
36	Lithia	13097 8034	1.725901	0.196350	11.38
	Totals:		1.725901	0.196350	

Young Refining
Douglas County, GA

========== Site Data ==========

Population:	32257.67
Households:	12270.46
Drilled Wells:	418.89
Dug Wells:	93.77
Other Water Sources:	54.01

========== Partial (RING) data ==========

---- Within Ring: 4 Mile(s) and 3 Mile(s) ----

Population:	12709.04
Households:	4761.60
Drilled Wells:	189.88
Dug Wells:	56.54
Other Water Sources:	5.61

** Population On Private Wells: 657.71

---- Within Ring: 3 Mile(s) and 2 Mile(s) ----

Population:	9260.90
Households:	3387.65
Drilled Wells:	107.87
Dug Wells:	30.73
Other Water Sources:	7.40

** Population On Private Wells: 378.91

---- Within Ring: 2 Mile(s) and 1 Mile(s) ----

Population:	7403.90
Households:	3042.54
Drilled Wells:	82.68
Dug Wells:	5.94
Other Water Sources:	22.39

** Population On Private Wells: 215.66

---- Within Ring: 1 Mile(s) and .5 Mile(s) ----

Population:	2222.70
Households:	844.14
Drilled Wells:	31.70
Dug Wells:	0.56
Other Water Sources:	14.93

** Population On Private Wells: 84.95

Young Refining
Douglas County, GA

---- Within Ring: .5 Mile(s) and .25 Mile(s) ----

Population:	541.11
Households:	194.94
Drilled Wells:	6.30
Dug Wells:	0.00
Other Water Sources:	3.68

** Population On Private Wells: 17.48

---- Within Ring: .25 Mile(s) and 0 Mile(s) ----

Population:	120.02
Households:	39.59
Drilled Wells:	0.46
Dug Wells:	0.00
Other Water Sources:	0.00

** Population On Private Wells: 1.38

** Total Population On Private Wells: 1356.09

Well search in E 334547 / 0844352 | AUG 30 '93 02:25PM

DATE: 08/30/93 PAGE 1

GRID NUMBER	STATION NAME	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	ALTITUDE OF LAND SURFACE (FEET)	DEPTH OF WELL (FEET)	BOTTOM OF CASING (FEET)	DIAMETER OF CASING (IN)	DATE OF CONSTRUCTION	DISCHARGE (GPM)	PRIMARY USE OF WATER
[illegible]	EASTWOOD MBL HM PARK	334518	0844307	1085.00	300	--	--	- -78	30.00	H

DATE: 08/30/93 WELL SEARCH FOR MCNAMARA AT 334547 0844352 WITH 2 MILE RADIUS PAGE 1

GRID NUMBER	STATION NAME	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	ALTITUDE OF LAND SURFACE (FEET)	DEPTH OF WELL (FEET)	BOTTOM OF CASING (FEET)	DIAMETER OF CASING (IN)	DATE OF CONSTRUCTION	DISCHARGE (GPM)	PRIMARY USE OF WATER
EE01	EASTWOOD MBL HM PARK	334518	0844307	1085.00	300	--	--	- -1978	30.00	H

DATE: 08/30/93 WELL SEARCH FOR MCNAMARA AT 334547 0844352 WITH 3 MILE RADIUS PAGE 1

GRID NUMBER	STATION NAME	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	ALTITUDE OF LAND SURFACE (FEET)	DEPTH OF WELL (FEET)	BOTTOM OF CASING (FEET)	DIAMETER OF CASING (IN)	DATE OF CONSTRUCTION	DISCHARGE (GPM)	PRIMARY USE OF WATER
EE01	EASTWOOD MBL HM PARK	334518	0844307	1085.00	300	--	--	- -78	30.00	H
8EE16	J.H. MCCOWN	334557	0844117	1058.0	350.0	52.0	6.0	05-18-88	15.0	H
8EE17	BILLY RAY SANDERS	334733	0844443	94.0	275.0	--	6.0	- -78	--	H
EE19	CONTRACTORS DRILLING & BL	334708	0844205	1140.0	205.0	63.0	6.0	06-10-88	10.0	U

DATE: 08/30/93 well search @ 334547 0844352 w/4 mile radius PAGE 1

GRID NUMBER	STATION NAME	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	ALTITUDE OF LAND SURFACE (FEET)	DEPTH OF WELL (FEET)	BOTTOM OF CASING (FEET)	DIAMETER OF CASING (IN)	DATE OF CONSTRUCTION	DISCHARGE (GPM)	PRIMARY USE OF WATER
EE01	COX, W A	334630	0844726	985.00	130	40.00	6.0	02- -61	10	H
07EE11	W. M. NORTON	334747	0844616	1050.0	44.0	44.0	30.00	06- -82	--	H
07EE12	CHARLES & BETTY MCCLEARY	334630	0844727	982.0	31.0	31.0	30.0	07-11-89	--	U
0013	RUSSEL MCCLARTY	334336	0844146	1065.0	155.0	35.0	6.0	09-29-88	6.0	H
EE01	EASTWOOD MBL HM PARK	334518	0844307	1085.00	300	--	--	- -78	30.00	H
8EE11	MR. & MRS. RAY E. TIDWELL	334869	0844440	995.0	313.0	--	6.0	- -49	7.0	S
8EE13	LAKESIDE MOBILE HOME,NO.3	334732	0844101	1035	260.0	--	6.0	- -85	--	P
EE14	LAKESIDE MOBILE HOME NO.1	334730	0844102	1050.0	252.0	--	6.0	- -67	26.0	P
EE15	LAKESIDE MOBILE HOME, NO2	334728	0844101	1040.0	240.0	--	6.0	- -72	43.0	P
8EE16	J.H. MCCOWN	334557	0844117	1058.0	350.0	52.0	6.0	05-18-88	15.0	H
EE17	BILLY RAY SANDERS	334733	0844443	94.0	275.0	--	6.0	- -78	--	H
EE19	CONTRACTORS DRILLING & BL	334708	0844205	1140.0	205.0	63.0	6.0	06-10-88	10.0	U

U.S. Geological Survey
Georgia District
GROUND-WATER SITE INVENTORY
Date: 8/30/93 Completed By: FMP&KDB
These data were collected as part of areal studies and DO NOT represent an exhaustive search of wells in the area

ONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ▶

To Jim McNamara	From Forest Platt
Dept./Agency GA EPD	Phone # 903-9100
Fax # 651-9425	Fax # USGS

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

REFERENCE

5

REVISED CLOSURE PLAN
FOUR SURFACE IMPOUNDMENTS

for

YOUNG REFINING CORPORATION

7982 Huey Road

Douglasville, GA

Clayton Project No. 68318.02

August 19, 1996

CONTENTS

August 19, 1996
Rev: 1

CLOSURE PLAN

1.0 INTRODUCTION

Pursuant to the Young Refining Corporation's facility Consent Order, NO. EPD-HW-1096, the following closure plan is provided for closing the four surface impoundments (ponds) at Young Refining in Douglasville, Georgia (Figure 1). This closure plan has been developed in accordance with Georgia Environmental Protection Division (EPD) regulations and 40 CFR Section 265, Subpart G Closure and Post Closure requirements, and 40 CFR Section 265.228.

Closure of the ponds is required under the Consent Order. The closure plan includes all four ponds as "the regulated hazardous waste management unit" at the facility. The regulated hazardous waste management unit was used for process wastewater and stormwater treatment, discharging through National Pollutant Discharge Elimination System (NPDES) permitted Outfall 001 to Cracker Creek.

The wastes generated in the surface impoundments (ponds) are listed hazardous wastes from nonspecific sources and have assigned hazardous waste numbers F037, petroleum refinery primary oil/water/solids separation sludge, and F038, petroleum refinery secondary (emulsified) oil/water/solids separation sludge. The basis for listing F037/F038 as hazardous waste is due to the hazardous constituents benzene, benzo(a)pyrene, chyrsene, lead, and chromium.

Ponds 2, 3, and 4 are basically rectangular shaped, flat bottomed earthen structures, while Pond 1 is an irregular shaped, sloping bottom structure. Figure 2 indicates general pond locations at the facility. During past activities, wastewater from the process operations and stormwater runoff entered either of two inground API separators before discharging into Pond 1. The waters then flow by gravity flow to Pond 2, Pond 3, and Pond 4, respectively,

prior to being discharged at NPDES Outfall 001. Ponds 1 and 2 are not aerated and serve as the primary oil recovery units, while Ponds 3 and 4 are aerated and serve as the biological treatment units.

A RCRA Facility Assessment (RFA) was completed for the site by EPD September 30, 1993. The RFA tentatively identified twelve (12) solid waste management units (SWMUs) needing further investigation as part of a RCRA Facility Investigation (RFI).

This closure plan describes the activities that will be carried out to close the area in Ponds 2, 3, and 4, such that they no longer contain hazardous waste or hazardous constituents, remove or decontaminate soils and equipment, and eliminate the requirement for capping these areas (Contingent Closure). The Pond 1 (and, if necessary, Pond 2) area will be used for biological treatment of the sludges and soils. If biological treatment does not reduce the hazardous waste constituents (benzene, benzo(a)pyrene, chrysene, lead and chromium) to background concentrations during the closure period, then the Contingent Closure Plan and Contingent Post Closure Plan will be implemented for the area of Pond 1.

Since some Appendix IX constituents have been detected in the groundwater surrounding the ponds, a Post-Closure plan for groundwater monitoring is provided as a separate plan.

The ponds contain petroleum refining oil/water/solids separation sludges, which are listed hazardous wastes with a hazardous waste code for toxicity. Some of the constituents for which the waste is listed have been detected in the pond water, sludges, and groundwater in the vicinity of the ponds. Indicator constituents (benzene, benzo(a)pyrene, chrysene, lead, chromium) will be used as the indicator constituents to determine the impact to the soils surrounding the ponds.

1.1 FACILITY LOCATION

The Young Refinery facility is located at 7982 Huey Road in Douglasville, Douglas County, Georgia (Figure 1). The site is situated upon approximately forty (40) acres, and is bordered on the north and east by woodlands, open pasture land and residential areas; west by former Arivec Chemicals facility, now operated as BRB, Inc., a used restaurant grease processor, and Central Oil Asphalt Company; and south by Norfolk-Southern railroad tracks and U.S. Highway 78. South of the railroad tracks is a mixture of commercial and residential developments. The four ponds addressed in this closure plan are located on the northwest portion of the subject property (Figure 2).

1.2 OWNER/OPERATOR INFORMATION

The name, address, telephone number, the EPA hazardous waste generator identification number, type of operation, and SIC Code are as follows:

Owner/Operator	Private held stock company J. Keener Hudson, President 7982 Huey Road Douglasville, GA 30133 Telephone Number 770-942-2343
EPA I.D. Number	GAD051011344
Type of Operations	Crude oil refinery
SIC Code	2911

2.0 FACILITY INFORMATION

Young Refining Corporation began operations as a refiner of crude oil (API Gravity 15-17 degrees) in 1954. The plant produces the following products from the refining of crude oil: asphalt, #2 diesel fuel, base lubricating oils and naphtha. In the mid to late 1980's, the plant produced JP-4 jet fuel on a limited contract basis. The current product stream and approximate percentages of production are as follows:

- asphalt 50%
- #2 diesel fuel 26%
- base lubricating oils 19 to 22%
- naphtha 1.5 to 3%

The facility receives crude oil and asphalt by rail tanker cars, and ships out refined products by rail and bulk tanker and flat bed trucks.

2.1 WASTEWATER TREATMENT SYSTEM

The four ponds are part of Young Refining's hazardous waste management unit. Other parts of the system are two API oil/water separators that receive process wastewater and stormwater runoff. The wastewaters from the API separators discharge to Pond 1, which then flowed in series by gravity flow to Pond 2, Pond 3, and Pond 4, respectively. The discharge was permitted by NPDES Permit No. GA 0001902, which expires June 30, 1997 (Appendix A). A process flow chart is presented in Figure 3.

Young Refining is expected to begin operation of a new wastewater treatment system to receive process wastewater by the end of August 1996. Only stormwater will continue to discharge to the pond system. Both discharge systems will combine prior to NPDES Outfall 001 and will discharge under the terms of the NPDES permit.

2.2 MAXIMUM EXTENT OF INVENTORY

All four ponds were constructed during the past twenty to forty years. Each pond was constructed using native soils of the site to construct earthen dams and/or berms for the purpose of retaining water. None of the ponds has a liner of either synthetic or natural materials.

For closure purposes, the maximum extent of the hazardous waste management unit is the four ponds plus a one hundred (100) foot border outlining the ponds, and the associated drainage ditches. The API separators are within the 100 foot border and are part of the hazardous waste management unit. The estimated maximum inventory (both water and sludge) for the ponds is:

Pond	Maximum Inventory
1	20,300 cubic feet = 151,844 gallons
2	63,000 cubic feet = 471,240 gallons
3	144,000 cubic feet = 1,077,120 gallons
4	100,000 cubic feet = 748,000 gallons
Total	327,300 cubic feet = 2,448,204 gallons

The thickness of the sludges in each pond is unknown, but from recent sampling events it is estimated to be one (1) foot or 12,600 cubic feet in Pond 2, three (3) to four (4) feet or 75,700 cubic feet in Pond 3, and one (1) to two (2) feet or 23,107 cubic feet in Pond 4. A preliminary estimate of 111,407 cubic feet or 833,324 gallons of sludge will be excavated from Ponds 2, 3, and 4 and placed into Pond 1 for biological remediation. Additionally, all visibly contaminated soils within the drainage ditches may have to be removed and placed in Pond 1 for biological treatment, if treatment cannot be performed in situ.

2.3 WASTE IDENTIFICATION

The waste accumulating in the ponds is listed waste from nonspecific sources, identified by EPA as F037 and F038, petroleum refinery primary and secondary oil/water/solids separation sludge. EPA's basis for listing the waste is due to the hazardous waste constituents benzene, benzo(a)pyrene, chrysene, lead, and chromium.

2.3.1 Pond Liquid

Previous sampling of the pond liquids, conducted by EPD in August 1991, indicated the presence of benzene, toluene, xylenes, acetone, methyl ethyl ketone, and 1,1- dichloroethane. A summary of the analytical results of the pond liquid conducted by EPD is shown in Table 1.

The NPDES Permit for this facility requires monitoring and analysis for pH; biological oxygen demand (BOD); chemical oxygen demand (COD); total suspended solids (TSS); oil & grease; zinc; benzene; total chromium; sulfide; ammonia as nitrogen; total phenolics; dissolved oxygen (DO); and toluene. Permitted effluent limits are presented in Table 2. Flow is monitored on a batch basis. Ammonia as nitrogen, sulfide, and zinc are the only analytes that have exceeded the daily average permit limits of 1.7 pounds/day, 0.1 pounds/day, and 0.11 mg/l, respectively. A summary of analytical results is located in Appendix B.

2.3.2 Pond Sludges

Previous sampling of the pond sludges was conducted by EPD in August 1991. Results are provided in Table 3.

Table 1
Summary of Analytical Results for Pond Liquids
Detected Compounds Only
EPD Sampling Event, August 1991

	Pond #1 Outfall (μg/l)	Pond #2 Outfall (μg/l)	NPDES Outfall (μg/l)	detection limit (μg/l)
benzene	1,100	500	ND	1
toluene	500	270	ND	1
o-xylene	230	150	ND	1
p-, m-xylene	420	260	ND	1
ethylbenzene	83	43	ND	1
acetone	800	730	ND	10
methyl ethyl ketone	220	270	ND	10
1,1-dichloroethane	ND	10	ND	1

ND Not detected at limit of detection
-- Not Analyzed
μg/l micrograms per liter [parts per billion (ppb)]

Table 2

NPDES Permit No. GA 0001902

Effluent Limitations

Parameter	Discharge Limitation			
	Daily Average (lb/day)	Daily Maximum (lb/day)	Daily Maximum (mg/l)	Sampling Frequency
BOD5	16	31	--	1/month
Total Suspended Solids	14	22	--	1/month
Chemical Oxygen Demand	82	159	--	1/month
Oil & Grease	5	10	--	1/month
Total Phenols	--	0.2	--	1/quarter
Phenol	--	--	--	1/quarter
Ammonia as Nitrogen	1.7	3.8	--	1/quarter
Sulfide	0.1	0.2	--	1/quarter
Total Chromium	--	--	0.210	1/quarter
Zinc	--	--	0.110	1/month
Benzene	--	--	--	1/month
Toluene	--	--	--	1/year
Dissolved Oxygen	--	--	--	1/month
pH	between 6.0 and 9.0 S.U.	--	--	1/month

Table 3
Summary of Analytical Results for Pond Sludges
Detected Compounds Only
EPD Sampling Event, August 1991

	EPD Pond Sediment #1 (mg/kg)	EPD Pond Sediment #2 (mg/kg)	EPD NPDES Outfall Sediment (mg/kg)	Detection Limit
benzene	1.5	ND	ND	0.25
toluene	3.5	ND	ND	0.25
ethylbenzene	2.3			0.25
o-xylene	6.9	ND	ND	0.25
p-,m-xylene	11.7	ND	ND	0.25
naphthalene	10	ND	ND	10
2-methyl naphthalene	11	ND	ND	--

ND Not Detected at detection limit
mg/kg milligrams per kilogram [part per million (ppm)]

In order to update the data and to provide needed information to address pond closure, another sampling event was conducted in March, 1996. Both, water and/or sludge samples were obtained from each pond. Water samples from Pond 1, and water and sludge samples from Ponds 3 and 4 were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (semi VOCs), and RCRA metals. Water and sludge samples from Pond 2 were analyzed for the full GA Modified Appendix IX constituents including dioxins/furans.

Complete analytical results for this sampling are provided in Appendix C. A summary of the analytical results for the sampled waters and sludges is provided in Table 4 and Table 5, respectively.

As would be expected based on the hazardous waste management unit system operation of flow in series, the concentrations of metals (barium, chromium, lead, and mercury) in the sludges decreased from Pond 2 through Pond 4. The presence of lead and chromium, metals for which the waste is listed, support using these metals as indicators for determining when background concentrations have been achieved. Barium was the only constituent detected in all collected water and sludge samples. The remaining constituents for which the waste is listed (benzene, benzo(a)pyrene, and chrysene) were not detected, at the limit of detection, in the collected water or sludge samples analyzed.

2.3.3 Groundwater Analytical Results

As a condition of the Consent Order, a preliminary groundwater monitoring system consisting of four monitor wells, in the uppermost water bearing zone underlying the ponds, was installed in August, 1994. The four wells (one upgradient and three downgradient) were sampled in August and September, 1994 and analyzed for all constituents listed in 40 CFR Part 264, Appendix IX using the Georgia Modified Standard Method (revised February 1991). A written report was submitted to the EPD in October, 1994 and, after verbal comments were received from EPD, a revised report, Preliminary Groundwater Assessment, was submitted in February, 1995; (Clayton Project No. 56310.00).

Pursuant to the results of the Appendix IX analysis indicating the presence of certain Appendix IX constituents in the uppermost water bearing zone, the submittal of a Groundwater Quality Assessment Plan was required.

Table 4
Summary of Analytical Results for Pond Liquids
Detected Compounds Only
Clayton Environmental Sampling Event, March 1996

	Pond 1 (μg/l)	Pond 2 (μg/l)	Pond 3 (μg/l)	Pond 4 (μg/l)	Method Detection Limit (μg/l)
barium	590	640	620	430	50
chromium	160	<40	70	<40	40
lead	360	<40	<40	<40	40*
mercury	2	<2	<2	<2	2
zinc	--	160	--	--	40
acetone	--	110	--	--	100
toluene	13	<5	5.5	<5	5
xylenes	17	<5	5.0	<5	5
1,2-trans-dichloroethylene	<5	<5	12	6.8	5
bis(2-ethylhexyl)phthalate	<100	<80	57	<10	100,80,10,10[A]
sulfide	--	4,600	--	--	500

number[A] detection limits for respective samples

-- Not submitted for analysis

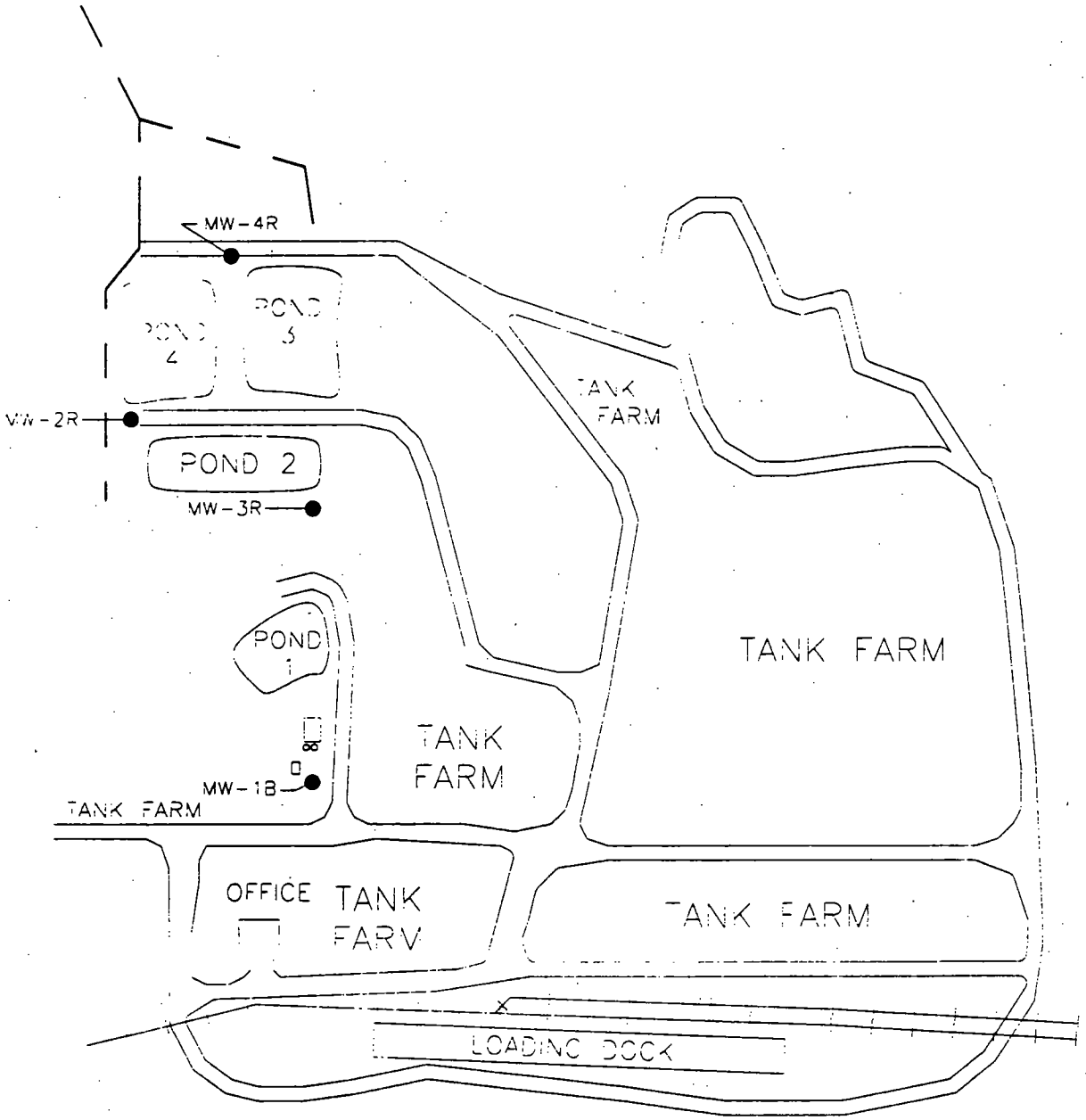
Table 5
Summary of Analytical Results for Pond Sludges
Detected Compounds Only
Clayton Environmental Sampling Event, March 1996

	Pond 2 (ppm)	Pond 3 (ppm)	Pond 4 (ppm)	detection limit (ppm)
sulfide	880	--	--	1
antimony	1	--	--	1
barium	140	42	0.50	2, 2, 0.04[A]
cadmium	1	<1	<0.01	1, 1, 0.01[A]
chromium	34	12	0.07	4, 4, 0.04[A]
cobalt	7	--	--	2
copper	39	--	--	4
lead	220	56	0.1	10, 8, 0.1[A]
mercury	0.34	0.21	<0.02	0.02
nickel	14	--	--	2
thallium	0.16	--	--	0.05
vanadium	13	--	--	2
zinc	220	--	--	2
1,2-trans-dichloroethylene	<25	<25	26	25 ppb
xylenes	<25	<25	34	25 ppb
bis(2-ethylhexyl)phthalate	<400	<100	110	400, 100, 40[A]

numbers[A] detection limits for respective samples
-- Not submitted for analysis

SUMMARY OF OPERATION MONITORING REPORTS FOR 1995
YOUNG REFINING CORPORATION

Parameter	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Daily Average Limit
BOD (lb/d)	4.94	1.80	1.53	1.10	1.54	1.20	1.11	1.37	0.94	0.77	1.58	2.35	16
COD (lb/d)	35.0	6.43	7.0	3.84	11.24	5.40	8.33	6.74	7.50	3.84	9.68	11.58	82
TSS(lb/d)	0.005	0.004	0.003	0.003	0.004	0.003	0.003	0.005	0.003	0.001	0.003	0.005	14
O&G (lb/d)	0.004	0.003	0.001	0.002	0.002	0.003	0.009	0.003	0.002	0.001	0.003	0.007	5
Zinc (mg/l)	0.033	0.09	0.04	0.01	0.08	0.10	0.03	0.01	<0.02	<0.02	0.06	0.04	0.11 mg/l
Benzene (lb/d)	<0.0002	<0.0003	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0003	<0.0002	--
Toluene (lb/d)	--	--	<0.0002	--	--	--	--	--	--	--	--	--	--
Total Cr (mg/l)	--	--	<0.010	--	--	<0.01	--	--	<0.02	--	--	<0.01	0.210 mg/l
Sulfide (lb/d)	--	--	<0.019	--	--	<0.011	--	--	<0.015	--	--	0.288	0.1
NH2 (lb/d)	--	--	<0.777	--	--	0.782	--	--	0.21	--	--	1.99	1.7
Phenol (lb/d)	--	--	<0.009	--	--	<0.002	--	--	0.002	--	--	<0.003	--
Dissolved Oxygen (mg/l)	12.4	10.8	9.6	8.30	2.0	6.6	5.7	5.4	7.80	9.3	10.8	13.1	--
pH	6.8 to 7.0	6.8 to 7.1	6.6 to 6.8	6.5 to 7.0	6.7 to 7.1	6.8 to 7.2	6.5 to 7.1	6.6 to 7.0	6.7 to 7.1	6.9 to 7.1	6.8 to 7.0	6.8 to 7.0	6.0 to 9.0



LEGEND

● = EXISTING WELL
R = RESIDUUM WELL
B = BEDROCK WELL
— · — = STREAM

NOT TO SCALE

FIGURE 2 SITE MAP	Clayton ENVIRONMENTAL CONSULTANTS	N	YOUNG REFINING CORPORATION 7982 HUEY ROAD DOUGLASVILLE, GEORGIA
		CLAYTON PROJECT NO 68318.02	YOUNG REFINING CORPORATION

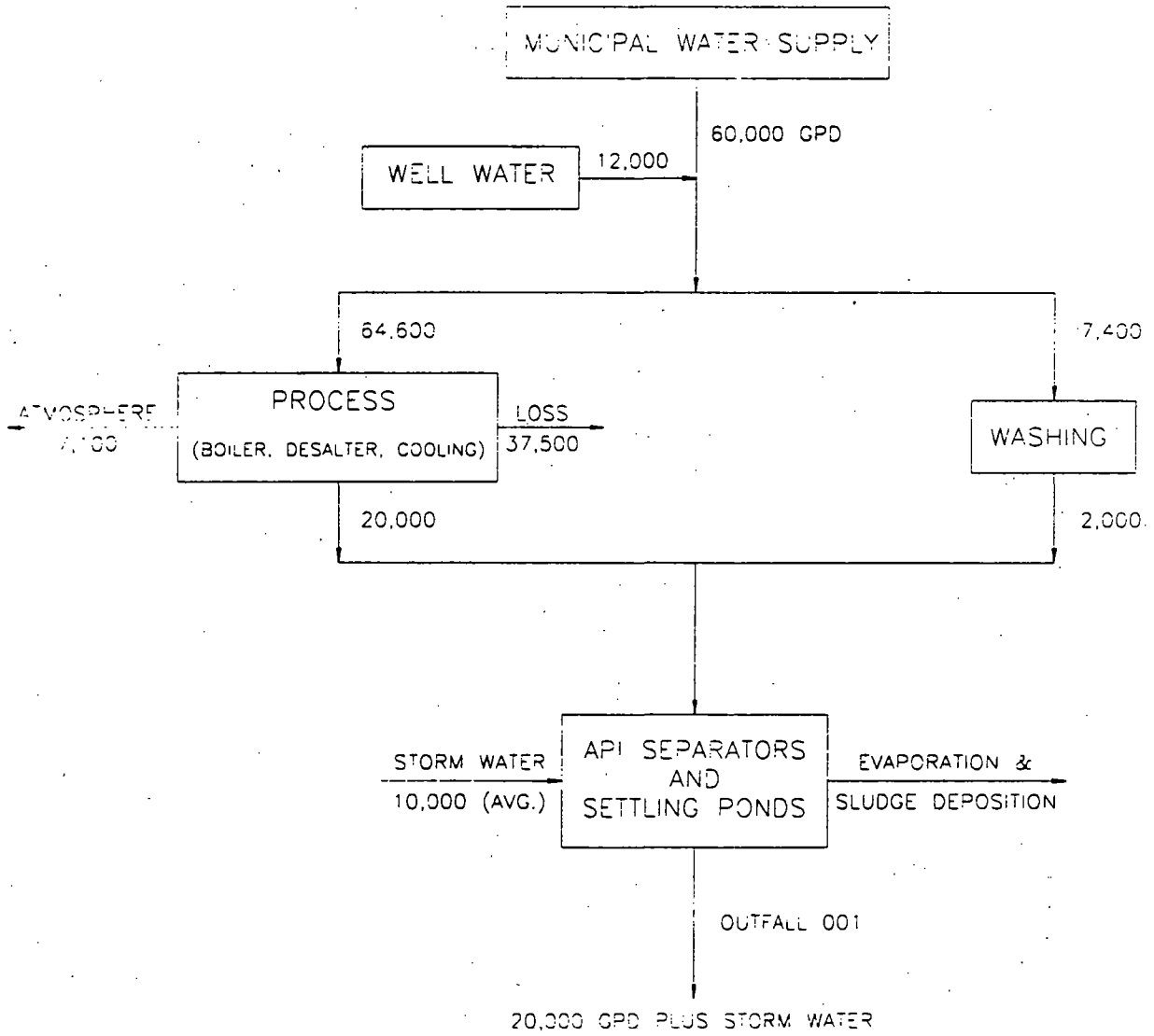


FIGURE 3
WASTEWATER FLOW SCHEMATIC

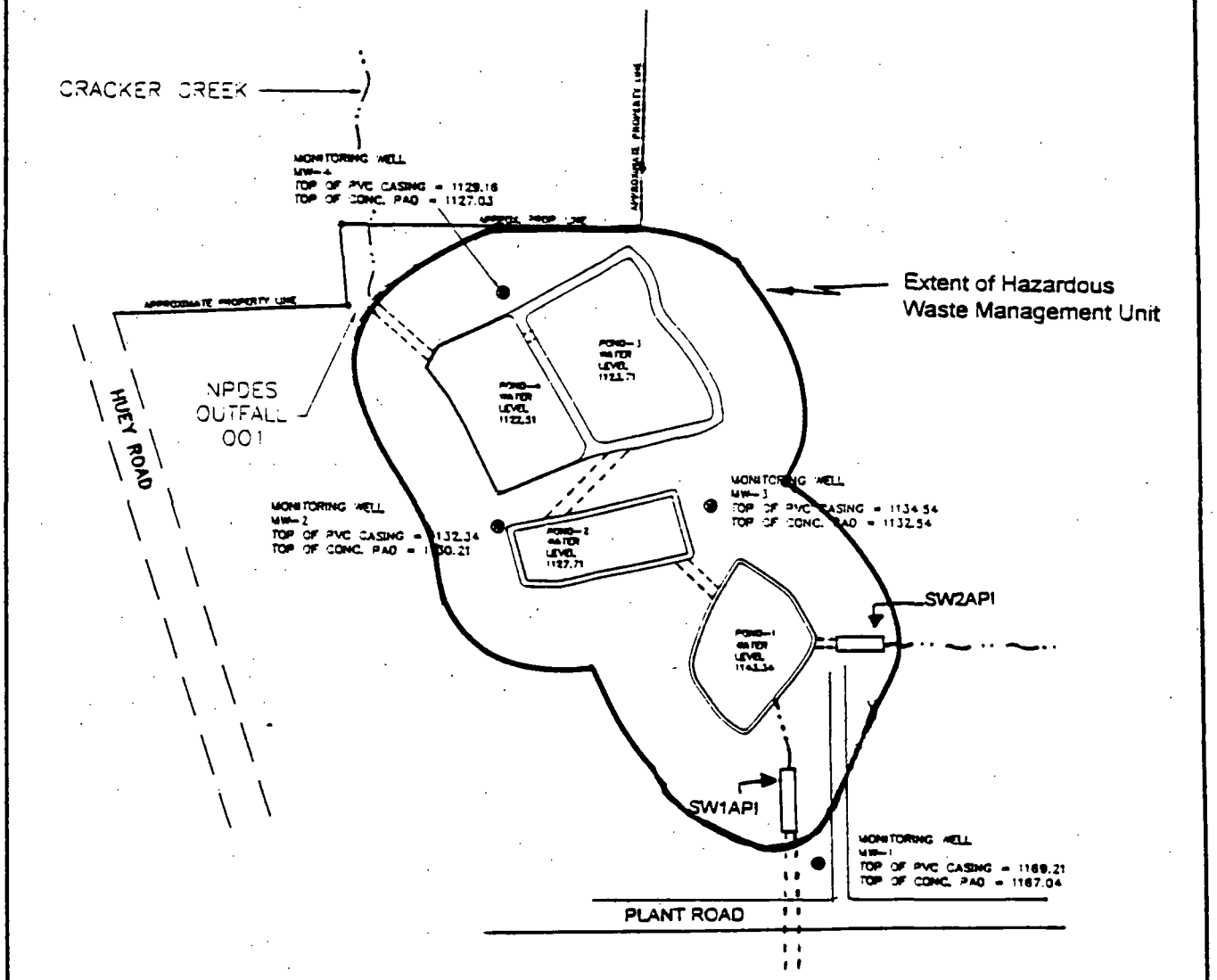
Clayton
ENVIRONMENTAL CONSULTANTS

N

YOUNG REFINING CORPORATION
7982 HUEY ROAD
DOUGLASVILLE, GEORGIA

CLAYTON PROJECT NO. 68318.02

YOUNG REFINING CORPORATION



LEGEND

= UNDERGROUND PIPING

= STREAM

NOT TO SCALE

FIGURE 4 MAXIMUM EXTENT OF OPERATIONS	Clayton ENVIRONMENTAL CONSULTANTS	N APPROXIMATE	YOUNG REFINING CORPORATION 7982 HUEY ROAD DOUGLASVILLE, GEORGIA
		CLAYTON PROJECT NO. 6831.02	YOUNG REFINING CORPORATION

REFERENCE 9

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

IN RE:

YOUNG REFINING CORPORATION
7982 Huey Road
Douglasville, Georgia

ORDER NO. EPD-HW-1096

RESPONDENT

CONSENT ORDER

WHEREAS, Young Refining Corporation (hereinafter "Respondent") owns and operates a refinery located at 7982 Huey Road, Douglasville, Georgia, which is engaged in the conversion of asphaltic crude oil to various oils, fuels and grades of asphalts (hereinafter the "Facility"); and

WHEREAS, Respondent is subject to the provisions of the Georgia Comprehensive Solid Waste Management Act (O.C.G.A. §§ 12-8-20 *et seq.*) and the rules promulgated pursuant thereto (hereinafter the "Solid Waste Management Rules"); and

WHEREAS, Rule 391-3-4-.04(1) of the Solid Waste Management Rules states that "[n]o person shall engage in solid waste handling in a manner which will . . . impair the quality of the environment . . ."; and

WHEREAS, on January 12, 1994, a Notice of Violation was sent by the Environmental Protection Division (hereinafter "EPD") to Respondent alleging that numerous areas of contaminated soil, resulting from spills, leaks, storage ponds and ditches, were present at the Facility in violation of Rule 391-3-4-.04; and

WHEREAS, Rule 391-3-4-.04(4)(c) states that "no solid waste may be disposed of by any person in an open dump, nor may any person cause, suffer, allow or permit open dumping on his property"; and

WHEREAS, EPD alleges that during an inspection conducted on October 14, 1993, by EPD representatives, the Facility premises were observed to contain solid waste disposed of by open dumping; and

WHEREAS, Rule 391-3-4-.04(5) states that "[t]he owner or occupant of any premises . . . shall be responsible for the collection and transportation of all solid waste accumulated at the premises . . . to a solid waste handling facility operating in compliance with these Rules . . .": and

WHEREAS, since the October 14, 1993, EPD inspection, Respondent has landfilled, at a permitted facility, more than 280 tons of off-spec asphalt product, and more than fourteen "roll-away" trailer loads of scrap metal have been sent to a metal recycler; and

WHEREAS, Respondent is subject to the provisions of the Georgia Air Quality Act (O.C.G.A. §§ 12-9-1 *et seq.*) and the rules promulgated pursuant thereto (hereinafter the "Air Quality Rules"); and

WHEREAS, Air Quality Permit #2911-048-10645 (hereinafter the "Air Permit") was issued to Respondent on December 28, 1990, for the operation of the Facility; and

WHEREAS, Condition 5 of the Air Permit states, "The Permittee shall not discharge or cause the discharge into the atmosphere from the entire Facility any emissions which exhibit greater than forty (40) percent opacity; and

WHEREAS, Rule 391-3-1-.02(2)(b) "Visible Emissions" of the Air Quality Rules, also prohibits "emissions from any air contaminant source the opacity of which is equal to or greater than forty (40) percent"; and

WHEREAS, on February 19, 1993, a representative of EPD completed a Record of Visual Determination of Opacity for visible emissions from the boiler stack located at the Facility; and

WHEREAS, said Record indicates the highest six-minute average opacity of visible emissions from the stack was forty-five (45) percent; and

WHEREAS, on March 15, 1993, a Notice of Violation was sent by EPD to Respondent alleging that excess air emissions were observed on February 19, 1993, and requiring Respondent to provide an explanation of the cause of the alleged violation and what preventive measures would be taken by Respondent to prevent future excess emissions; and

WHEREAS, Respondent submitted a report dated March 22, 1993, stating that difficulties experienced by an operator adjusting the oil pressure to increase boiler steam pressure resulted in an apparent incident of excess emission; and

WHEREAS, EPD alleges that excess emissions observed by EPD on February 19, 1993, were an unexcused violation of Condition 5 of the Air Permit as being due to inadequate operational practices and not caused by start up, shut down, or malfunction; and

WHEREAS, Respondent subsequently investigated the possible causes of the operator's difficulties and alleges that an emergency shut down of the refinery had occurred a short time before the operator attempted to adjust the oil pressure, that the emergency shut down was due to the malfunction and loss of the crude oil heater fuel pump, that the shut down had the effect of dramatically increasing the pressure to the boiler oil feed line, and that this effect, which was unexpected and beyond the operator's previous experience, caused the operator's difficulties in adjusting the oil pressure to the boiler; and

WHEREAS, having ascertained the cause of the opacity incident, Respondent has instituted procedures whereby (1) operational conditions in the plant that could cause increased pressure on any part of the fuel oil system must be routinely communicated to the refinery superintendent, the refinery manager, and the environmental officer; and (2) all employees who

regularly or might possibly adjust fires and furnaces or boilers are conducted through special procedures for high pressure operation; and

WHEREAS, Respondent is subject to the provisions of the Georgia Water Quality Control Act (O.C.G.A. §§ 12-5-20 *et seq.*) and the rules promulgated pursuant thereto (hereinafter the "Water Quality Rules"); and

WHEREAS, O.C.G.A. § 12-5-29(a) of the Georgia Water Quality Control Act makes it unlawful to use any waters of the State for the disposal of sewage, industrial wastes, or other waste, except in such manner as to conform with all rules, regulations, orders, and permits established under the provisions of said Act; and

WHEREAS, Respondent has been issued NPDES Permit #GA0001902, dated September 4, 1992, pursuant to the Georgia Water Quality Control Act (hereinafter the "NPDES Permit"); and

WHEREAS, EPD alleges that on February 13-19, and February 26-27, 1993, Respondent's discharge at the permitted NPDES outfall generated excessive amounts of foam into Cracker Creek; and

WHEREAS, the discharge of excessive amounts of foam into Cracker Creek is a violation of Part I.A.1 of the NPDES Permit, which prohibits the discharge of other than trace amounts of foam; and

WHEREAS, Respondent alleges that the foam was generated due to the presence in the discharge of an excessive amount of non-hazardous de-foaming agent; and

WHEREAS, Respondent alleges that the presence of excess de-foaming agent occurred because Facility employees were crushing empty 55-gallon drums for disposal, and that a drum

believed to be empty contained a few gallons of de-foaming agent, which was released and entered the process wastewater system; and

WHEREAS, Respondent responded, as requested by EPD, by removing visible foam from the receiving tributary; and

WHEREAS, Respondent, in order to prevent further such occurrences, has instituted a procedure whereby all empty drums are visually inspected and/or volumetrically measured to confirm that they are empty before any drum crushing operations are conducted; and

WHEREAS, EPD alleges that Respondent violated the limitations of the NPDES Permit on February 17, 1993, by discharging 3.87 pounds of ammonia-nitrogen, which exceeded by 2.17 pounds the daily NPDES Permit limit of 1.7 pounds per day; and

WHEREAS, EPD sent Respondent a Notice of Violation dated March 1, 1993, concerning the discharge of foam and alleging that Respondent has failed to satisfy the requirement of Part II.A.2 of the NPDES Permit to notify EPD orally within 24 hours and in writing within five days of the Facility's inability to meet any effluent limitation, alleging that Respondent was conducting insufficient monitoring of the discharge, and specifying additional monitoring to be conducted by Respondent; and

WHEREAS, Respondent reported the discharge of excess of ammonia to EPD by telephone upon receiving the analytical results; and

WHEREAS, Respondent submitted to EPD a letter dated March 11, 1993, which reported that the Facility promptly acted to correct the excess ammonia by adding a new bacterium and a buffering compound that were believed to be more active in cold weather than the standard bacteria, and which provided results of the additional monitoring requested by EPD in its March 1, 1993, Notice; and

WHEREAS, EPD alleges that it has documented inadequate treatment facility operation and maintenance as required by Part II.A.3 of the NPDES Permit; and

WHEREAS, EPD alleges that Respondent has intermittently violated the NPDES permit limits for oil and grease; and

WHEREAS, EPD alleges that the Facility has had periodic bypasses of its wastewater treatment facility in violation of Part II.A.5 of the NPDES Permit; and

WHEREAS, Respondent is subject to the provisions of the Georgia Hazardous Waste Management Act (O.C.G.A. §§ 12-8-60 *et seq.*, as amended) (hereinafter the "Act"), and the rules promulgated pursuant thereto (hereinafter the "Hazardous Waste Rules"); and

WHEREAS, Respondent has notified EPD of its status as a small quantity generator of hazardous wastes listed as K048, K050, and K051; and

WHEREAS, EPD issued a Notice of Violation to Respondent on December 9, 1985, alleging that Respondent had illegally land disposed of these wastes on-site; and

WHEREAS, Respondent alleges that it has not, since the 1985 Notice from EPD, disposed of any K051 waste either on-site or off-site; and

WHEREAS, pursuant to the NPDES Permit, Respondent operates an oil-water separation system consisting of a two-cell API separator for primary separation and a four-pond cascade (hereinafter the "Ponds") for secondary separation and secondary (biological) treatment; and

WHEREAS, Respondent's oil-water separation system receives process wastewater and storm water runoff; and

WHEREAS, EPD alleges that its representatives have observed significant quantities of oil on the surface of Ponds No. 1 and 2 on several occasions; and

WHEREAS, the EPD Air Protection Branch has required removal of all oil from the surface of the Ponds since May of 1987 to control fugitive hydrocarbon emissions; and

WHEREAS, EPD sampled the water at the outfalls from Ponds #1 and #2 on July 29, 1991; and

WHEREAS, subsequent analysis of these samples showed concentrations of benzene at 1,100 and 500 ug/l, respectively, and elevated levels of acetone, toluene, ethylbenzene, methyl ethyl ketone (MEK), and total xylene; and

WHEREAS, effective November 1, 1990, concentrations of benzene in excess of 500 ug/l are cause for characterizing waste as D018, toxic for benzene, per § 261.24 of the Hazardous Waste Rules; and

WHEREAS, effective May 2, 1991, petroleum refinery primary oil/water/solids separation sludge and petroleum refinery secondary oil/water/solids separation sludge became listed as hazardous waste as F037 and F038, respectively; and

WHEREAS, EPD therefore alleges that the Facility is generating F037 and F038 in the Ponds of the oil-water separation system; and

WHEREAS, §§ 270.1 and 270.70 of the Hazardous Waste Rules require submission of a notification of hazardous waste activity within 90 days of a revision to Part 261 of the Hazardous Waste Rules (identifying and listing hazardous waste); and

WHEREAS, Respondent has not submitted the required notification; and

WHEREAS, §§ 270.1(c) and 391-3-11-.11 of the Hazardous Waste Rules require owners and operators of facilities that treat, store, or dispose of hazardous waste to obtain a hazardous waste facility permit (hereinafter "TSDF Permit") from the Director of EPD (hereinafter the "Director") and maintain it during the active life of the facility; and

WHEREAS, § 270.10(e)(1) of the Hazardous Waste Rules requires newly regulated facilities to submit a Part A Permit Application within six months to qualify for Interim Status; and

WHEREAS, Respondent has not submitted a Part A application and therefore has not obtained Interim Status; and

WHEREAS, § 270.70(a) of the Hazardous Waste Rules states that Interim Status facilities should be treated as having a Permit during the Permit review and approval process; and

WHEREAS, the discharge from the oil-water separation system, sampled by EPD at the outfall from Pond No. 4, showed a benzene concentration of less than 1 *ug*/l during the July 29, 1991, sampling event; and

WHEREAS, §§ 260.10 and 270.2 of the Hazardous Waste Rules define "Treatment" as "any method, technique or process, including neutralization, designed to change the physical, chemical or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste nonhazardous, or less hazardous; safer to transport, store or dispose of; or amenable for recovery, amenable for storage, or reduced in volume"; and

WHEREAS, the Ponds conform to the § 260.10 definition of a surface impoundment; and

WHEREAS, EPD alleges that Respondent violated the Hazardous Waste Rules by treating hazardous waste in a surface impoundment without a TSDF Permit; and

WHEREAS, § 268.4(b) of the Hazardous Waste Rules specifically prohibits evaporation of hazardous constituents from a surface impoundment as a means of treatment; and

WHEREAS, EPD alleges that Respondent violated the Hazardous Waste Rules by treating hazardous waste in an impermissible manner; and

WHEREAS, all newly regulated facilities are subject to the Part 265 Interim Status rules until the Permit review and approval process is complete; and

WHEREAS, §§ 262.11, 265.13, and 268.7 of the Hazardous Waste Rules require a waste analysis and identification of hazardous constituents in the Ponds; and

WHEREAS, EPD alleges that Respondent failed to classify properly the hazardous constituents in the Ponds; and

WHEREAS, § 265.221 of the Hazardous Waste Rules requires all surface impoundments that treat, store, or dispose of hazardous waste to have two or more liners and a leachate collection system; and

WHEREAS, the Ponds do not have liners or leachate collection systems; and

WHEREAS, Respondent has modified its process by the addition of a stripper for the purpose of recycling benzene from the process wastewater and returning it for reuse in the original process from which it was generated, thus preventing the generation of D018 waste; and

WHEREAS, the North Georgia Regional Office of EPD conducted a routine inspection of the Facility on December 20, 1988, and took a sample from a groundwater well located behind Pond #3; and

WHEREAS, subsequent analysis of the sample showed 1800 *ug*/l of benzene, 870 *ug*/l of toluene, and 314 *ug*/l of total xylenes; and

WHEREAS, BTEX (benzene, toluene, ethylbenzene, and total xylenes) are indicator parameters for petroleum contamination; and

WHEREAS, EPD alleges that this contamination is a result of Respondent's operations; and

WHEREAS, O.C.G.A. § 12-8-65(a)(15) empowers the Director to encourage voluntary cooperation by persons in affected groups to achieve the purposes of the Act; and

WHEREAS, O.C.G.A. § 12-8-71 of the Act requires the Director to remedy violations of the Act and obtain corrective action for releases to the environment by "conference, conciliation, or persuasion"; and

WHEREAS, Respondent does not, by entering into this Consent Order, admit to the violation of any State law or liability to any third party or parties; and

WHEREAS, an amicable resolution to the dispute outlined in the above allegations has been determined to be in the best interests of the citizens of the State of Georgia.

NOW, THEREFORE, before the taking of any testimony and without adjudicating the merits of the parties' positions in this matter, the parties hereby resolve the alleged violations in this case by Agreement and upon the ORDER of the DIRECTOR and the Consent of RESPONDENT, as follows:

1. Respondent shall immediately operate the Facility in full compliance with NPDES Permit #GA0001902.

2. Respondent shall immediately operate the Facility in full compliance with Air Quality Permit #2911-048-10645.

3. Respondent shall immediately cease any unauthorized solid waste handling practices at the Facility.

4. Within forty-five (45) days after the execution by the Director of this Order, Respondent shall collect all unused drummed additives and lubrication oil located on the Facility premises and either recycle them within the plant or properly dispose of them as wastes.

5. Within one-hundred twenty (120) days after the execution by the Director of this Order, Respondent shall ensure that all unused trailers on site, which are suitable for metals recycling, are cut and removed from the Facility premises by a scrap metal recycler or are disposed of in a permitted solid waste landfill.

6. Within ninety (90) days after the execution by the Director of this Order, Respondent shall complete sorting and separating recyclable scrap metal and other materials suitable for recycling from non-recyclable materials.

7. Within one-hundred twenty (120) days after the execution by the Director of this Order, Respondent shall remove the non-recyclable solid waste generated by the sorting activities described in the previous paragraph and dispose of it in a permitted solid waste landfill; this deadline may be extended by the number of documented days that the work cannot physically be performed due to rainfall and resulting saturated conditions where the materials to be removed are located.

8. Within one-hundred twenty (120) days after the execution by the Director of this Order, Respondent shall remove all non-recyclable materials from the area east of Pond 3 and dispose of these materials in a permitted solid waste landfill; this deadline may be extended by the number of documented days that the work cannot physically be performed due to rainfall and resulting saturated conditions in the area east of Pond #3.

9. Within ninety (90) days after the execution by the Director of this Order, Respondent shall tow all non-operational personal vehicles off the Facility premises.

10. Within ninety (90) days after the execution by the Director of this Order, Respondent shall collect all used tires located on the Facility premises and either recycle them or remove them from the premises to a permitted disposal facility.

11. Respondent shall submit documentation to EPD of all solid wastes disposed of off-site in the form of receipts provided by the permitted disposal facility or facilities.

12. Within one-hundred twenty (120) days after execution by the Director of this Order, Respondent shall remove off-spec product and any petroleum-contaminated soils from the areas designated by the EPD RCRA Facility Assessment dated September 30, 1993 as Unit #4, the "Recreation Building" Solid Waste Management Unit (SWMU), and Unit #11, Abandoned Tanker SWMU #2, and shall properly dispose of the material or beneficially reuse the material in a manner authorized by the Solid Waste Management Rules.

13. Within forty-five (45) days after the execution by the Director of this Order, Respondent shall notify EPD of all hazardous waste activities at the facility by submitting a form entitled "Notification of Hazardous Waste Activity," EPA Form No. 8700-12.

14. Respondent shall ensure that no hazardous waste characterized as D018 is disposed of in the Ponds at any time.

15. Within forty-five (45) days after the execution by the Director of this Order, Respondent shall complete and submit to EPD a Part A Application for a hazardous waste facility permit, including identification and general location of all existing or planned areas or units at the facility used for the treatment, storage, or disposal of hazardous waste.

16. Respondent shall immediately remove any oil from the surface of the Ponds.

17. Within sixty (60) days after the execution by the Director of this Order, the Respondent shall complete the installation of a groundwater monitoring system, as defined in § 260.10 of the Hazardous Waste Rules, which consists of four monitoring wells and which meets the requirements of § 265.91, in the uppermost aquifer underlying the Ponds.

18. Within twenty-one (21) days after installation of the groundwater monitoring system required in Condition 17 above, Respondent shall complete sampling of the upgradient and downgradient wells for all constituents listed at Part 264, Appendix IX. Sampling and analysis shall be conducted in accordance with the Georgia Modified Standard Method (revised February 1991).

19. Within sixty (60) days after completion of sampling required by Condition 18 above, Respondent shall submit to EPD a written report of all analytical results therefrom.

20. If the analytical results submitted by Respondent pursuant to Condition 19 above indicate the release of any Appendix IX constituent, Respondent must submit to EPD a groundwater quality assessment plan. The plan must be certified by a qualified geologist or a geotechnical engineer and must specify:

(a) The number, location, and depth of wells;

(b) Sampling and analytical methods for those hazardous wastes or hazardous constituents in the Facility;

(c) Evaluation procedures, including any use of previously gathered groundwater quality information; and

(d) A schedule of implementation.

21. EPD shall review the plan submitted pursuant to Condition 20 above and make recommendations, based on the experience of EPD, that may contribute to the effectiveness of the plan to determine:

(a) The rate and extent of migration of the hazardous waste or hazardous constituents in the groundwater; and

(b) The concentration of the hazardous waste or hazardous constituents in the groundwater.

EPD shall provide Respondent with written notification of approval of the plan, including any revisions.

22. Respondent shall begin implementation of the groundwater quality assessment plan within forty-five (45) days after receipt of written approval from EPD pursuant to Condition 21 above.

23. Respondent shall measure and record the groundwater surface elevation at each monitoring well each time a sample is obtained.

24. For the first twelve (12) months after this Order is executed, Respondent shall sample all monitoring wells installed pursuant to this Order for all parameters included in the approved groundwater quality assessment plan at a minimum frequency of once per calendar quarter. Thereafter, Respondent shall collect and analyze samples semi-annually from each monitoring well installed pursuant to this Order for the parameters included in the approved groundwater quality assessment plan, until certification of closure of the Ponds is accepted by EPD.

25. Respondent shall submit to EPD a summary of groundwater elevations and chemical analyses determined pursuant to Conditions 23 and 24 above by no later than thirty (30) days following the end of each sampling event.

26. Within one-hundred eighty (180) days after submittal of the first written report required in Condition 25 above, Respondent shall submit to EPD a closure plan (hereinafter the "Plan") for the Ponds, which meets the requirements of Subpart G of Part 265 and § 265.228 of the Hazardous Waste Rules.

27. EPD shall review the Plan submitted pursuant to Condition 26 above and provide Respondent with a list of deficiencies, if any. Respondent shall correct any such deficiencies within thirty (30) days after notification by EPD. EPD will then review and modify the Plan as necessary and provide opportunity for review and comment. EPD shall provide Respondent with written approval of the Plan after consideration of all written comments and further revision, if necessary.

28. All changes to Respondent's wastewater treatment system implemented pursuant to the Plan shall be sufficient to ensure compliance with the effluent limitations set forth in the Facility's NPDES Permit.

29. Within sixty (60) days after EPD approval of the Plan, Respondent shall seek a modification of the Facility's NPDES Permit to incorporate the changes in the wastewater treatment system that are required under the Plan. Until such time as the Department of Natural Resources issues a final decision on the requested permit modification, implementation of the Plan as required by this Order shall be deemed to be an authorized activity under the Georgia Water Quality Control Act.

30. Simultaneously with the submission of the Plan required pursuant to Condition 26 above, Respondent shall submit to EPD a detailed written estimate of the cost of closure of the facility as required by § 265.142 of the Hazardous Waste Rules.

31. Within thirty (30) days of EPD approval of the Plan, Respondent shall furnish EPD financial assurance for closure as required by § 265.143 of the Hazardous Waste Rules.

32. Within ninety (90) days of execution by the Director of this Order, Respondent

shall furnish to EPD evidence of the liability insurance coverage for sudden accidental occurrences as required by § 265.147(a) of the Hazardous Waste Rules.

33. In the event Respondent is unable to provide the financial assurance required in Condition 31 above or the liability insurance required in Condition 32 above, Respondent shall immediately notify EPD of its inability to obtain such assurance or coverage, and Respondent shall update its ability to obtain such assurance or coverage to EPD in writing annually thereafter.

34. Within forty-five (45) days after receiving written approval pursuant to Condition 26 above, Respondent shall begin closure of the Ponds in accordance with the approved Plan.

35. Within ninety (90) days after receipt of EPD approval of the Plan, Respondent shall submit to EPD a Part B post-closure care permit application for the Ponds pursuant to §§ 264.228, 265.117, and 270.1(c) of the Hazardous Waste Rules.

36. Simultaneously with the submission of the post-closure permit application required pursuant to Condition 35 above, Respondent shall submit to EPD a detailed written estimate of the cost of post-closure care of the facility as required by § 265.144 of the Hazardous Waste Rules.

37. Simultaneously with the certification of completion of closure in accordance with the Plan approved by EPD, Respondent shall furnish financial assurance for post closure care as required by § 265.145 of the Hazardous Waste Rules.

38. Within one-hundred eighty (180) days after the submission of the closure Plan, Respondent shall submit to EPD a written plan for conducting a RCRA Facility Investigation (RFI) addressing the potential solid waste management units (SWMUs) identified in the RCRA Facility Assessment (RFA) of the Facility prepared by EPD and dated September 30, 1993. The

RFI work plan shall contain a sampling verification task to confirm the releases from potential SWMUs.

39. Within sixty (60) days after completing the RFI pursuant to Condition 38 above to address the solid waste management units, Respondent shall submit a plan, including a schedule, for removing and disposing of contaminated soils resulting from the spillage of petroleum product that were not previously addressed under Condition 12 above.

40. In addition to the requirements provided for in Conditions 1 through 39 above, Respondent agrees to a negotiated settlement of $400,000 as follows:

(a) Respondent shall perform $225,000 worth of supplemental environmental projects (SEPs) at the Facility. An SEP shall be defined as a facility improvement that will result in a reduced risk to human health and the environment from operations or releases, and that is not required by a current or proposed rule at the time the SEP is chosen.

Respondent shall obtain the services of a qualified environmental professional, subject to EPD approval, who shall perform a pollution prevention and abatement audit of the facility and make recommendations regarding SEPs. Respondent shall submit these recommendations to EPD within one-hundred fifty (150) days of the date of execution by the Director of this Order. SEPs to be performed by the Respondent pursuant to this Order shall be selected by EPD from the SEPs identified in the audit, except that other SEPs may be identified and mutually agreed upon by EPD and Respondent. Within thirty (30) days after EPD approval of the list of SEPs, Respondent shall submit to EPD a schedule of implementation.

Respondent shall begin implementation of the SEPs immediately upon receipt of EPD approval of the SEP implementation schedule.

The SEP funding schedule shall be subject to the following constraints:

1) $45,000 worth of SEPs shall be in progress or completed within one year of execution of this Order;

2) $110,000 (total) worth of SEPs shall be in progress or completed within two years of execution of this order;

3) $175,000 (total) worth of SEPs shall be in progress or completed within three years of execution of this Order;

4) $225,000 (total) worth of SEPs shall be in progress or completed within four years of execution of this order. All SEPs must be completed within four and one-half years of execution of this Order;

For the purposes of this Order, "in progress" shall be defined as an SEP for which Respondent has a design and has entered into a binding financial agreement for construction. Respondent shall hold these documents available for EPD review during the term of this Order.

Should Respondent fail to meet any of the deadlines for fund allocation contained in (a) 1-4 above, a non-performance penalty of $25,000 shall be due to EPD within thirty (30) days following the missed deadline. Such non-performance penalties shall not accrue during any period of time during which noncompliance with a deadline is caused by an event or circumstance arising from unforeseen causes beyond the control of the Respondent and not the result of the fault or negligence of the Respondent, provided that Respondent notifies EPD in writing

within 48 hours of discovering that compliance will be delayed. Excusable delay shall not include increased costs or expenses associated with performing the SEPs, nor shall it include failure to apply for any required permits and approvals. Payment of this penalty shall not relieve Respondent of the requirement to accomplish the SEPs.

(b) Respondent shall pay a monetary settlement of $175,000 to EPD as follows:

1) $25,000 within ten days of execution by the Director of this Order;

2) $50,000 within one year of execution by the Director of this Order;

3) $50,000 within two years of execution by the Director of this Order;

4) $50,000 within three years of execution by the Director of this Order;

Should Respondent be more than ten (10) working days late with the payment in (b) 1 above, or more than thirty (30) working days late with any of the payments in (b) 2-4 above, the entire balance remaining ($175,000 - payments to date) shall be due within thirty (30) days.

This Consent Order shall not constitute a finding or adjudication of any violation of any state or federal laws or rules or permit requirements by the Respondent, nor does the Respondent through its signing of this Consent Order make any admissions of any violations of state or federal laws or rules or of any liability to any third party.

By agreement of the parties, this Order shall be considered final and effective immediately; the parties hereby resolve, by agreement, all claims or violations alleged herein; this document shall not be appealable; and the Respondent hereby waives any hearing on the terms and conditions of same.

It is so Ordered and Agreed to. this 8th day of July, 1994.

GEORGIA ENVIRONMENTAL PROTECTION DIVISION

By: Harold F. Reheis

Harold F. Reheis, Director
Environmental Protection Division

YOUNG REFINING CORPORATION

By:

Title: PRESIDENT

REFERENCE 10

ENVIRONMENTAL PROTECTION DIVISION
DEPARTMENT OF NATURAL RESOURCES
STATE OF GEORGIA

IN RE:	Young Refining Corporation	#	ORDER NO.
	7982 Huey Road	#	EPD-HW- 1163
	Douglasville, Georgia	#	
		#	
	RESPONDENT	#	

ADMINISTRATIVE ORDER

WHEREAS, Young Refining Corporation (hereinafter "Respondent") owns and operates a refinery located at 7982 Huey Road, Douglasville, Georgia, which is engaged in the conversion of asphaltic crude oil to various oils, fuels, and grades of asphalt (hereinafter "Facility"); and

WHEREAS, Respondent is subject to the provisions of the Georgia Hazardous Waste Management Act (O.C.G.A. §§ 12-8-60, et seq., as amended) (hereinafter the "Act") and the Rules promulgated pursuant thereto (hereinafter "Rules"); and

WHEREAS, Respondent's wastewater treatment occurs in a system of two API separators and a four pond cascade fed by a series of drainage ditches; and

WHEREAS, Respondent's wastewater treatment system receives oily wastewaters from a petroleum refining operation; and

WHEREAS, petroleum refinery primary and secondary oil/water/solids separation sludges were listed as hazardous wastes on November 02, 1990, and were assigned waste codes F037 and F038, respectively; and

WHEREAS, Respondent manages hazardous wastes listed as F037 and F038 in ponds and ditches at the Facility; and

WHEREAS, the ponds meet the definition of "surface impoundments" presented in §260.10 of the Rules; and

WHEREAS, the F037/F038 listing became effective on May 02, 1991; and

WHEREAS, all Federal Hazardous Waste rules are promulgated pursuant to the Resource Conservation and Recovery Act (42 U.S.C. §§ 6901 et seq.) (hereinafter "RCRA"); and

WHEREAS, Section 3005 (j)(6)(A) of RCRA requires that surface impoundments receiving newly-listed wastes must either retrofit to the minimum technical requirements contained in the Rules or cease receiving hazardous waste within four years of the effective date of the waste listing; and

WHEREAS, Respondent's surface impoundments have not been retrofitted to meet the minimum technical requirements in the Rules; and

WHEREAS, the Director of the Georgia Environmental Protection Division (hereinafter "Director") is required "(t)o establish hazardous waste management standards for the state, provided that they are in all cases not less stringent than those standards provided by the federal act "(O.C.G.A. 12-8-65 (20)); and

WHEREAS, the Director is further required "(t)o take all necessary steps to ensure that the administration of this article is consistent with and equivalent to the provisions of the federal act and any standards, rules, or regulations promulgated thereunder toward the end that the State of Georgia shall have maximum control over hazardous waste management practices in the state "(O.C.G.A. 12-8-65 (21)); and

WHEREAS, the Director is empowered "(t)o issue...orders as may be necessary to ensure...compliance with this article and all rules or regulations promulgated hereunder "(O.C.G.A. 12-8-65 (11)).

NOW, THEREFORE, the Director hereby ORDERS the Respondent to do and accomplish the following:

1) By May 02, 1995, cease discharge of any oily wastewaters, that will lead to the generation of F037 and/or F038, to the ditches and ponds at the Facility; or

2) Retrofit the ponds at the Facility to the minimum technical standards in §264 Subpart K of the Rules and replace ditches with pipes.

The Respondent is hereby informed to the right to be represented by legal counsel; to petition for a hearing on this Order within thirty (30) days from the date of issuance of same; and that such Order shall become final unless a petition for hearing is filed within thirty (30) days from the date of issuance of same.

Pursuant to Chapter 391-1-2 of the Rules and Regulations of the State of Georgia, the original and one copy of any petition for hearing, to which a copy of this Order must be attached, shall be filed with the Administrative Hearing Clerk for the Administrative Law Judge for the Board of Natural Resources, to wit:

The Honorable Mark A. Dickerson
Administrative Law Judge
Office of Administrative Hearing Clerk
Board of Natural Resources
205 Butler Street, SE
Floyd Towers East, Suite 1254
Atlanta, Georgia 30334

One copy of any such petition for hearing shall be simultaneously served by certified mail or personal service upon the Director of the Division , to wit:

Harold F. Reheis, Director
Environmental Protection Division
Department of Natural Resources
205 Butler Street, SE
Floyd Towers East, Suite 1152
Atlanta, Georgia 30334

and a separate copy similarly served on his counsel or record, to wit:

The Honorable Robert S. Bomar
Senior Assistant Attorney General
Department of Law
Room 108, State Judicial Building
Atlanta, Georgia 30334

A copy of the rules governing the filing of a petition for hearing, and the procedures involved therein, may be found at Chapter 391-1-2 of the Rules and Regulations of the State of Georgia published by the Georgia Secretary of State or may be obtained from the Administrative Hearing Clerk at a cost of $1.00.

THIS ORDER ISSUED on the 27th day of April, 1995

Harold F. Reheis
Director

r:\mcnamara\young.ref\admin.odr

REFERENCE 11

YOUNG REFINING CORPORATION
DOUGLASVILLE, GEORGIA

POND NO. 3

CLEAN CLOSURE SAMPLING REPORT

Prepared For:

Young Refining Corporation
7982 Huey Road
Douglasville, Georgia 30134

Prepared by:
ENVIRONMENTAL PLANNING SPECIALISTS, INC.

Ted Peyser
Project Manager

January 18, 1999

YOUNG REFINING CORPORATION
DOUGLASVILLE, GEORGIA

POND NO. 3 CLEAN CLOSURE SAMPLING REPORT

Table of Contents

ATTACHMENTS

Laboratory Analytical Reports

- September 1998 sampling results
- December 1998 sampling results

Drawing Nos.

- Y-008-998
- Y-008-999

YOUNG REFINING CORPORATION
DOUGLASVILLE, GEORGIA

POND NO. 3 CLEAN CLOSURE SAMPLING REPORT

EXECUTIVE SUMMARY

Young Refining Corporation (Young) intends to utilize the existing former wastewater treatment pond and storm water retention pond, designated as Pond 3, as their long term storm water retention pond. Since the pond is within a Hazardous Waste Management Unit (HWMU), it cannot be utilized as a storm water retention pond unless it is *clean closed* in accordance with RCRA closure standards.

In order to clean close Pond 3, the sediment in the pond had to be removed. A sediment cell was constructed to hold the Pond 3 sediment, and 4,000 cubic yards of sediment were subsequently removed from Pond 3 and placed in the cell.

The Pond 3 walls and bottom were then sampled to determine if the target hazardous waste constituents (F037/F038 constituents) were at background levels, which would allow for clean closure. Sampling was conducted in September 1998. Additional excavation of a pond wall and floor area, and re-sampling, were conducted in December 1998. The results of the sampling events are shown in the Executive Summary Table 1 below.

As shown in the table, all benzene sample analytical results were non-detect at the laboratory detection limit. The total lead was reported at below 100 mg/kg for all samples. The total chromium was reported at below 20 mg/kg for all samples.

Subsequent telephone conversations were held with GEPD personnel, Jim McNamara and Clifford Opdyke, Ph.D. (Risk Assessment Division of the Hazardous Waste Branch). When asked whether these analytical results are sufficient to allow for clean closure of Pond 3, Jim McNamara differed to Clifford Opdyke. Clifford Opdyke stated that these levels do not pose a risk to human health or the environment and that they are acceptable to allow for clean closure of Pond 3.

Accordingly, Young will prepare the clean closure demonstration report that will include the following:

1. Certification that Pond 3 is clean (in accordance with RCRA);
2. Request that Pond 3 be removed from the hazardous waste management unit (HWMU);
3. Proposed new boundary for the HWMU;
4. Proposed new point-of-compliance well location.

YOUNG REFINING CORPORATION
DOUGLASVILLE, GEORGIA

POND NO. 3 CLEAN CLOSURE SAMPLING REPORT

1.0 INTRODUCTION

Young Refining Corporation (Young) intends to utilize the existing Pond 3 as their long term storm water retention pond. Since the pond is within a Hazardous Waste Management Unit (HWMU), it cannot be utilized as a storm water pond unless it is *clean closed* in accordance with RCRA closure standards. This document briefly describes the steps that have been taken to achieve clean closure.

This document also presents the methodology and laboratory results of the closure-related Pond 3 soil sampling events that occurred in September and December 1998.

Table 1. September 1998 Pond 3 Sampling Results

SAMPLE LOCATION	F037 / F038 CONSTITUENT CONCENTRATIONS (IN MG/KG)				
	Lead	Chromium	Benzene	Benzo(a)pyrene	Chrysene
Side walls					
SS1	7.44	6.87	ND	ND	ND
SS2	6.65	8.41	ND	---	---
SS3	20.4	6.35	ND	---	---
SS4	17.3	8.76	ND	---	---
SS5	3.19	1.99	ND	ND	ND
SS6	3.55	0.99	0.78	---	---
SS7	1.91	ND	ND	---	---
SS8	6.41	3.81	ND	---	---
Bottom					
BS1	6.96	1.79	ND	---	---
BS2	110	19.6	ND	---	---
BS3	2.42	1.41	ND	ND	ND
BS4	1.82	ND	0.30	---	---
BS5	6.76	1.99	ND	---	---
BS6	46.7	8.52	0.90	ND	ND
BS7	11.7	1.58	ND	---	---
BS8	56.0	53.0	0.60	---	---

Notes:

SS - Side wall sample
BS - Bottom sample
ND - Not detected
--- - Not sampled

Proposed for excavation and re-sampling

Results are summarized as follows:

5. Benzo(a)pyrene and chrysene were not detected in any of the four samples analyzed
6. Benzene was detected in four samples.
7. Lead was detected above 25 mg/kg in three samples.
8. Chromium was detected above 20 mg/kg in one sample.

Based on the sampling results and in accordance with subsequent discussions with Jim McNamara of GA EPD, additional excavation and soil sampling was required. This sampling was conducted in December 1998, and is discussed in Section 4.

4.0 DECEMBER 1998 SAMPLING EVENT

4.1 Additional Excavation and Phase II Sampling

Based on the September 1998 sampling results and in accordance with subsequent discussions with GEPD, additional excavation and soil sampling was required. In December, 1998, Young excavated additional soils in and around the areas described in Section 3 as shown in Drawing Y-008-999, attached. The specific areas excavated are identified on the drawing as Side Sample Location SS-6, and Bottom Sample Location BS-2, BS-4, BS-6, and BS-8. Excavation was conducted using a track drag-line, dump truck, and front end loader. Excavated materials were placed in the sediment call.

Once the excavation was completed, the five sample locations discussed above were re-sampled in accordance with the proposed re-sampling as described in Section 3 (Table 1) and shown below in in Table 2.

Table 2. December Sampling Parameters

SAMPLE LOCATION	CONSTITUENTS SAMPLED FOR		
	Lead	Chromium	Benzene
Side wall			
SS6			X
Bottom			
BS2	X		
BS4			
BS6	X		X
BS8	X	X	X

Table 3. December 1998 Pond 3 Sampling Results

SAMPLE LOCATION	F037 / F038 CONSTITUENT CONCENTRATIONS (IN MG/KG)		
	Lead	Chromium	Benzene
Side walls			
SS6	NS	NS	ND
Bottom			
BS2	39	NS	NS
BS4	NS	NS	ND
BS6	65.1	NS	ND
BS8	91.3	17.2	ND

Notes:

SS - Side wall sample
BS - Bottom sample
ND - Not detected (at 0.50 mg/kg)

As shown in the Table, all benzene sample analytical results were non-detect. The total lead was reported at below 100 mg/kg for all samples.

Subsequent telephone conversations were held with GEPD representatives, Jim McNamara and Clifford Opdyke, Ph.D. (Risk Assessment Division of the Hazardous Waste Branch). When asked whether these analytical results are sufficient to allow for clean closure of Pond 3, Jim McNamara differed to Clifford Opdyke. Clifford Opdyke stated that these levels do not pose a risk to human health or the environment and that they are acceptable to allow for clean closure of Pond 3.

Accordingly, Young will prepare the clean closure demonstration report that will include the following:

1. Certification that Pond 3 is clean (in accordance with RCRA);
2. Request that Pond 3 be removed from the hazardous waste management unit (HWMU);
3. Proposed new boundary for the HWMU;
4. Proposed new point-of-compliance well location.

REFERENCE 12

INFORMATION SUMMARY
205-J
TOXIC SUBSTANCES STREAM MONITORING PROJECT

FY-89

Site Name: Douglasville **County:** Douglas **WQMU:** 1214

Facility Name(s): Young Refining Corp.; Arivec Chemicals, Inc.

Permit Number(s): GA0001902

Monitoring Station - Number: 12116001 **Water Use Classification:** Fishing

- Name: Cracker Cr.-Trib to Gothards Cr., Malone Road Douglasville

Distance Downstream from Discharge(s): 0.5 miles

Biotic Sampling Conducted: 89/06/14 **Summary:** The stream had a reduced macroinvertebrate community primarily due to siltation. The community present was dominated by dipterans.

Aquatic Biomonitoring Conducted: _____ **Summary:** _____

Comments: Sampling was discontinued for FY90.

Samples Collected:

Water (Number/Dates)	2: 88/10/03, 88/11/09
Sediment (Number/Dates)	2: 88/10/03, 88/11/09
Fish (Number/Dates)	1: 88/09/20
Facility (Number/Dates)	1: 88/10/25

Data Summary: **Water:** Ammonia concentrations exceeded EPA chronic criterion. Total phenols were 23 and 563 mg/l. Organic compounds detected were methyl-ethyl ketone, acetone, 2-methyl phenol, benzyl alcohol, 2-butoxy-ethanol, 1,1-oxy Bis (2-ethoxy) ethane, 1(2-butoxy-ethoxy) ethanol, 2[2(2-ethoxy) ethoxy] ethanol, and 2 [2(2-butoxy ethoxy) ethoxy] ethanol. **Sediment:** Metals detected include chromium, copper, lead, nickel, and thallium. Organic compounds detected include tri-chloro-fluoromethane, DDT, and DDD. **Facility:** Specific conductance was elevated. Total phenols measured at 88 mg/l and zinc at 260 µg/l. **Fish:** No elevated concentrations of metals or organic compounds were detected.

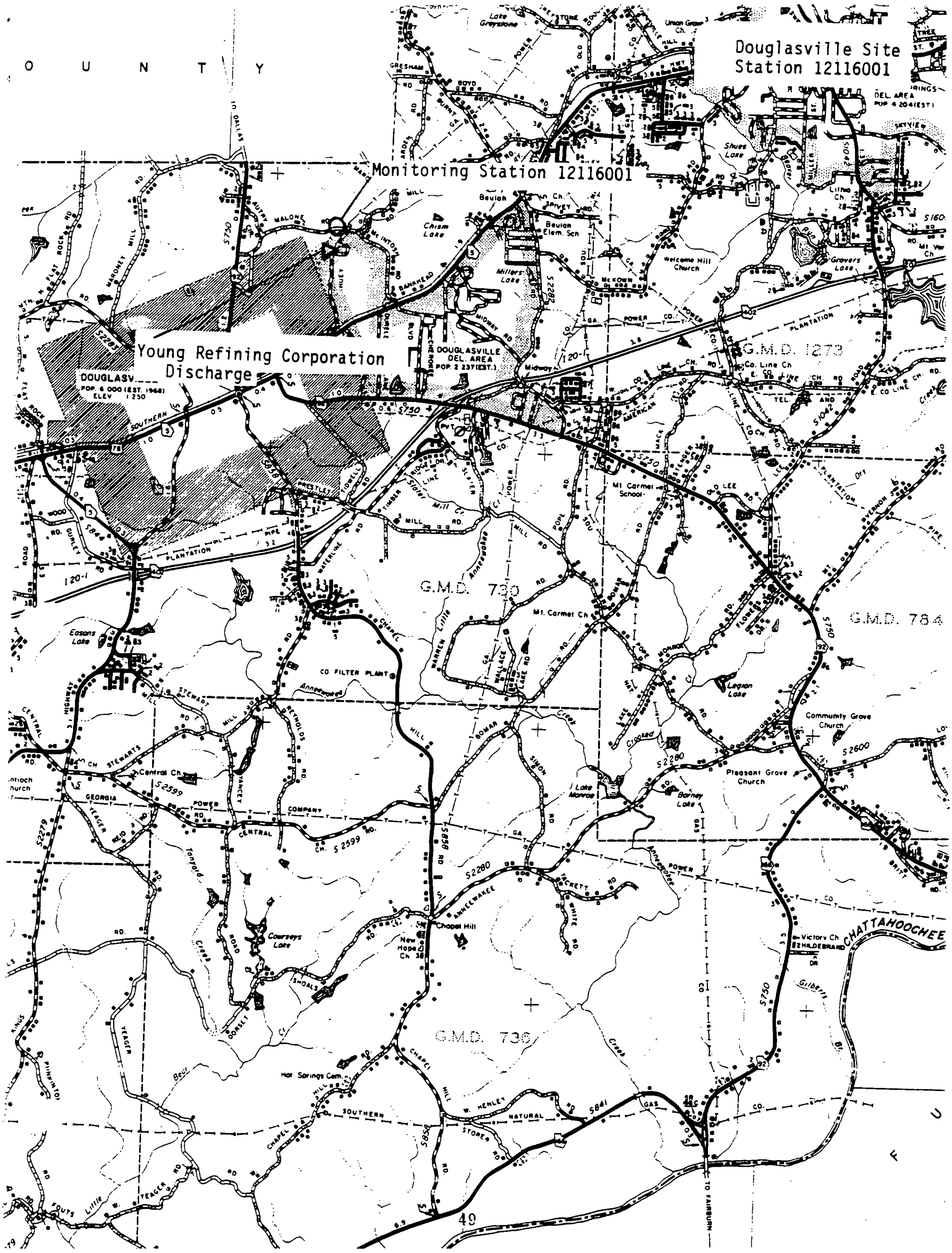
PARAMETER LIST FOR DOUGLASVILLE SITE
FY89

MONITORING STATION: 12116001 Cracker Creek - Tributary to Gothards Creek, Malone Road, Douglasville

FIELD PARAMETERS

Dissolved Oxygen
Water Temperature

LABORATORY PARAMETERS		SAMPLE TYPE
FISH	Same as Water* (excl. CN, O-V)	Whole Fish
SEDIMENT	Solids, % of Total	Sediment
	Volatile Solids, % of Total	
	COD + Same as Water*	
WATER	pH, Conductivity, Hardness, Suspended Solids, Hexavalent Chromium	RC
	Sulfide	S
	Total Phenols	T-PHEN
	COD, Ammonia	NUT
	Antimony, Arsenic, Beryllium, Cadmium, Total Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, Zinc	M
	Cyanide	CN
*	Methylene Chloride, Benzene	O-V
	4-Nitrophenol, Phenol	O-A
	Bis-(2-ethylhexyl) Phthalate, Pyrene	O-BN
	DDE, DDT, alpha-BHC, beta-BHC	O-P


Douglasville Site
Station 12116001
Monitoring Station 12116001
Young Refining Corporation
Discharge
G.M.D. 730
G.M.D. 784
G.M.D. 736
G.M.D. 1273
CHATTAHOOCHEE
DOUGLASVILLE DEL. AREA POP. 2 237 (EST.)
Chapel Hill
Mt. Carmel Ch
Community Grove Church
Pleasant Grove Church
Victory Ch
TO FAIRBURN

STORET RE EVAL DATE 90/05/25 PGM=ALLPARM

16001
33 46 19.0 084 43 58 0 3
CRACKER CR. TRB TO GOTHARDS CR-MALONE RD, DOUGLASV
13097 GEORGIA DOUGLAS
SOUTHEAST 033000
CHATTAHOOCHEE
21GAEPD 890107 03130002
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

	INITIAL DATE			88/09/20	88/10/03	88/10/03	88/11/09	88/11/09
	INITIAL TIME			0001	1355	1610	1150	1210
	MEDIUM			FISH	WATER	SED	WATER	SED
	DEPTH-FT(SMK)			0	0	0	0	
00008	LAB	IDENT	NUMBER	110	3221	3220	3728	3730
00010	WATER	TEMP	CENT		21.0		13.5	
00011	WATER	TEMP	FAHN		69.8$		56.3$	
00020	AIR	TEMP	CENT		21.0		14.5	
00027	COLLECT	AGENCY	CODE	50	21	21	21	21
00095	CNDUCTVY	AT 25C	MICROMHO		476		394	
00300	DO		MG/L		6.5		8.1	
00301	DO	SATUR	PERCENT		72.2$		76.4$	
00335	COD	LOWLEVEL	MG/L		56.1		27.6	
00339	COD MUD	DRY WGT	MG/KG			5552		4059
00403	PH	LAB	SU		13.3		7.2	
00530	RESIDUE	TOT NFLT	MG/L		85		2	
00610	NH3+NH4-	N TOTAL	MG/L		2.050		2.160	
00612	UN-IONZD	NH3-N	MG/L		2.047$		.008$	
00619	UN-IONZD	NH3-NH3	MG/L		2.489$		.010$	
00720	CYANIDE	CN-TOT	MG/L		.050K		.050K	
00721	CYANIDE	SEDMG/KG	DRY WGT			1.60K		1.60K
00745	SULFIDE	TOTAL	MG/L		.10K		.10K	
00900	TOT HARD	CACO3	MG/L		63		48	
01002	ARSENIC	AS, TOT	UG/L		60K		60K	
01003	ARSENIC	SEDMG/KG	DRY WGT			6.00K		6.00K
01004	ARSENIC	TISMG/KG	WET WGT	1.00K				
01012	BERYLIUM	BE, TOT	UG/L		10.00K		10.00K	
01013	BERYLIUM	SEDMG/KG	DRY WGT			1.20		1.00K
01027	CADMIUM	CD, TOT	UG/L		10K		10K	
01028	CD MUD	DRY WGT	MG/KG-CD			1.00K		1.00K
01029	CHROMIUM	SEDMG/KG	DRY WGT			23.00		14.00
01032	CHROMIUM	HEX-VAL	UG/L		50K			
01034	CHROMIUM	CR, TOT	UG/L		10K		20K	
01042	COPPER	CU, TOT	UG/L		20K		20K	
01043	COPPER	SEDMG/KG	DRY WGT			12.00		3.90
01051	LEAD	PB, TOT	UG/L		25K		25K	
01052	LEAD	SEDMG/KG	DRY WGT			8.10		3.00K
01059	THALLIUM	TL, TOTAL	UG/L		70K		60K	

(SAMPLE CONTINUED ON NEXT PAGE)

50

STORET RET EVAL DATE 90/05/25 PGM=ALL PARM

.16001
33 46 19.0 084 43 58.0 3
CRACKER CR; TRB. TO GOLHARDS CR-MALONE RD; DOUGLASV
13097 GEORGIA DOUGLAS
SOUTHEAST 033000
CHATTAHOOCHEE
21GAEPD 890107 03130002
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

	INITIAL DATE			88/09/20	88/10/03	88/10/03	88/11/09	88/11/09
	INITIAL TIME			0001	1555	1610	1150	1210
	MEDIUM			FISH	WATER	SED	WATER	SED
	DEPTH-FT(SMK)			0	0	0	0	
01067	NICKEL	NI, TOTAL	UG/L		20K		20K	
01068	NICKEL	SEDMG/KG	DRY WGT			5.30		2.00K
01069	NICKEL	TISMG/KG	WET WGT	1.00K				
01073	THALLIUM	TIS-WET	MG/KG	1.00K				
01077	SILVER	AG, TOT	UG/L		20.0K		40.0K	
01078	SILVER	SEDMG/KG	DRY WGT			2.00K		2.00K
01092	ZINC	ZN, TOT	UG/L		24		23	
01093	ZINC	SEDMG/KG	DRY WGT			26.00		9 30
01097	ANTIMONY	SB, TOT	UG/L		100K		60K	
01098	ANTIMONY	SEDMG/KG	DRY WGT			5.00K		6.00K
01099	ANTIMONY	TIS-WET	MG/KG	1.00K				
01147	SELENIUM	SE, TOT	UG/L		100K		60K	
01148	SELENIUM	SEDMG/KG	DRY WGT			15.00K		6.00K
01149	SELENIUM	TISMG/KG	WET WGT	1.00K				
32730	PHENOLS	TOTAL	UG/L		563		23	
34237	BENZENE	SEDUG/KG	DRY WGT			1.000K		1.000K
34252	BERYLIUM	TISMG/KG	WET WGT	1.000K				
34257	BETA BHC	SEDUG/KG	DRY WGT			1.000K		1.000K
34423	METHYLEN	ECHLORID	TOTWUG/L		10.000K		5.000K	
34426	MTHLENCL	SEDUG/KG	DRY WGT			5.000K		5.000K
34468	PHENOL	TISMG/KG	WET WGT	1.000K				
34469	PYRENE		TOTWUG/L		10.000K		10.000K	
34472	PYRENE	SEDUG/KG	DRY WGT			200.000K		200.000K
34473	PYRENE	TISMG/KG	WET WGT	1.000K				
34474	SILVER	TISMG/KG	WET WGT	1.000K				
34480	THALLIUM	SEDMG/KG	DRY WGT			120.000		26.000
34488	TRICHLOR	OFLUOROM	TOTWUG/L		1.000K		1.000K	
34491	TRCLFLM1	SEDUG/KG	DRY WGT			3.000		
34646	4NITROPH	ENOL	TOTWUG/L		50.000K		50.000K	
34649	4NPHENOL	SEDUG/KG	DRY WGT			1000.000K		1000.000K
34690	4NPHENOL	TISMG/KG	WET WGT	5.000K				
34694	PHENOL		TOT UG/L		10.000K		10.000K	
34695	PHENOL	SEDUG/KG	DRY WGT			200.000K		200.000K
39076	ALPHABHC	SEDUG/KG	DRY WGT			1.000K		1.000K
39099	B2ETHXPH	TISMG/KG	WET WGT	1.00K				
39100	B2ETHHXL	PHTHALAT	TOT UG/L		10.000K		10.000K	
39102	B2E PHTH	MUD-DRY	UG/KG			200K		200K

(SAMPLE CONTINUED ON NEXT PAGE)

16001
33 46 19.0 084 43 58 0 3
CRACKER CR: TRB: TO GOTHARDS CR-MALONE RD: DOUGLASV
13097 GEORGIA DOUGLAS
SOUTHEAST 033000
/TYPA/AMBNT/STREAM CHATTAHOOCHEE
21GAEPD 890107 03130002
0000 FEET DEPTH

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

	INITIAL DATE			88/09/20	88/10/03	88/10/03	88/11/09	88/11/09
	INITIAL TIME			0001	1555	1610	1150	1210
	MEDIUM			FISH	WATER	SED	WATER	SED
	DEPTH-FT(SMK)			0	0	0	0	
39337	ALPHABHC		TOTUG/L		.100K		.010K	
39338	BETA BHC		TOTUG/L		.200K		.010K	
39359	DDT SUM	ANALOGS	MUDUG/KG			85.00		
39360	DDD	WHL SMPL	UG/L		.020K		.020K	
39363	DDD	MUD	UG/KG			32.00		
39365	DDE	WHL SMPL	UG/L		.010K		.010K	
39368	DDE	MUD	UG/KG			1.00K		1.00K
39370	DDT	WHL SMPL	UG/L		.020K		.020K	
39373	DDT	MUD	UG/KG			53.00		2.00K
39379	TOT DDT	WHL SMPL	UG/L		.050K		.050K	
39516	PCBS	WHL SMPL	UG/L		.300K	6.000K		
50060	CHLORINE	TOT RESD	MG/L				.02	
70318	RESIDUE	TOTAL	PERCENT			77.2		75.9
70322	RESIDUE	TOT VOL	PERCENT			3.3		1.3
71900	MERCURY	HG.TOTAL	UG/L		.2K		.2K	
71921	MERCURY	SEDMG/KG	DRY WGT			.1K		.1K
71936	LEAD	TISMG/KG	WET WGT	1.00K				
71937	COPPER	TISMG/KG	WET WGT	2.10				
71938	ZINC	TISMG/KG	WET WGT	42.00				
71939	CR-FISH	UG/G DR	MG/KG WT	1.00K				
71940	CADMIUM	TISMG/KG	WET WGT	1.00K				
74041	WQF	SAMPLE	UPDATED	891010	890127	890127	890315	890216
74995	ANATOMY		CODE	59				
75059	ACETONE	SED DRY	WGTUG/KG			10.000K		
75078	MTH ETH	KET SED	DRYUG/KG			10.000K		
75212	BNZYLALC	SED DRY	WGTUG/KG			200.000K		
77147	BNZYLALC	TOTAL	UG/L		58.500			
77152	O-CRESOL	TOTAL	UG/L				10.000K	
78124	BENZENE	HOH VOL	UG/L				1.00K	
78872	2MEPHENO	DRY WGT	SEDUG/KG			200.00K		
81552	ACETONE		TOT UG/L		180.000		10.000K	
81595	MTH ETH	KETONE	TOT UG/L		79.000			
81614	NO. INDV	IN THE	SAMPLE	5				
81615	NO. DIFF.	SPECIES	IN SMPL	1				
81683	2-BUTOXY	ETHANOL	TOT MG/L		16.000J			
82579	COLLECT	PERSON	CODE		127	127	127	127

YOUNG REFINING CORPORATION
EFFLUENT SAMPLE
OCTOBER 25, 1988

PARAMETER	VALUE
Lab ID #	3538
Water Temperature (°C)	13.5
Dissolved Oxygen (mg/l)	7.8
pH	7.4
Conductivity (µmho/cm)	1040
Hardness (mg/l)	111
Total Suspended Solids (mg/l)	30
Sulfide (mg/l)	<0.1
Total Phenols (µg/l)	88
COD (mg/l)	110
Ammonia (mg/l)	7.5
Methylene Chloride (µg/l)	<5
Benzene (µg/l)	<1
Methyl-Ethyl-Ketone (µg/l)	<10
Acetone (µg/l)	<10
Tri-Chloro Fluoromethane (µg/l)	<1
PCB's (µg/l)	<3
Phenol (µg/l)	<10
4-Nitro Phenol (µg/l)	<50
Bis(2-ethylhexyl) phthalate (µg/l)	<10
Pyrene (µg/l)	<10
DDT Total (µg/l)	<0.2
DDE Total (µg/l)	<0.1
DDD Total (µg/l)	<0.2
DDT+DDE+DDD Total (µg/l)	<0.2
alpha-BHC (µg/l)	<0.1
beta-BHC (µg/l)	<0.1
Arsenic (µg/l)	<80
Beryllium (µg/l)	<10
Cadmium (µg/l)	<10
Total Chromium (µg/l)	<10
Hexavalent Chromium (µg/l)	<50

YOUNG REFINING CORPORATION

Copper (µg/l)	<20
Lead (µg/l)	<30
Mercury (µg/l)	<0.2
Nickel (µg/l)	<20
Selenium (µg/l)	<100
Silver (µg/l)	<30
Thallium (µg/l)	<100
Zinc (µg/l)	260

REFERENCE 13

Protected Plants of Georgia

AN INFORMATION MANUAL ON PLANTS DESIGNATED BY THE STATE OF GEORGIA AS ENDANGERED, THREATENED, RARE, OR UNUSUAL

Thomas S. Patrick
James R. Allison
Gregory A. Krakow

1995

Georgia Department of Natural Resources
Joe D. Tanner, Commissioner
Wildlife Resources Division
David Waller, Director
Georgia Natural Heritage Program
John R. Bozeman, Program Manager

Chattooga
Carex purpurifera
Cypripedium acaule
Hydrastis canadensis ?
Platanthera integrilabia
Sabatia capitata
Sagittaria secundifolia
Sarracenia oreophila ?

Cherokee
Cypripedium acaule
Cypripedium calceolus
Lysimachia fraseri
Nestronia umbellula
Sabatia capitata
Schisandra glabra

Clarke
Cypripedium acaule
Cypripedium calceolus
Draba aprica
Nestronia umbellula
Sedum pusillum

Clay
Arabis georgiana
Croomia pauciflora
Matelea alabamensis
Rhododendron prunifolium
Trillium reliquum
Veratrum woodii

Clayton
Cypripedium acaule

Clinch
Myriophyllum laxum
Sarracenia flava
Sarracenia minor

Cobb
Cypripedium acaule
Cypripedium calceolus
Draba aprica
Hexastylis shuttleworthii var. *harperi*
Nestronia umbellula
Platanthera integrilabia
Rhus michauxii
Schisandra glabra

Coffee
Balduina atropurpurea
Elliottia racemosa
Epidendrum conopseum
Evolvulus sericeus
Litsea aestivalis
Marshallia ramosa
Penstemon dissectus
Sarracenia flava
Sarracenia minor
Sarracenia psittacina

Colquitt
Balduina atropurpurea
Litsea aestivalis
Sarracenia flava
Sarracenia minor
Sarracenia psittacina

Columbia
Amphianthus pusillus
Draba aprica
Elliottia racemosa
Hymenocallis coronaria
Isoetes tegetiformans
Marshallia ramosa
Rhus michauxii
Sarracenia rubra
Scutellaria ocmulgee
Sedum pusillum
Trillium reliquum

Cook
Balduina atropurpurea
Sarracenia flava
Sarracenia minor
Sarracenia psittacina

Coweta
Platanthera integrilabia

Crawford
Sarracenia rubra
Silene polypetala

Crisp
Balduina atropurpurea
Penstemon dissectus
Sarracenia flava
Sarracenia minor
Sarracenia psittacina

Dade
Cypripedium acaule
Cypripedium calceolus
Sabatia capitata
Scutellaria montana
Silene regia
Spiraea virginiana

Dawson
Cypripedium acaule
Cypripedium calceolus
Hydrastis canadensis
Waldsteinia lobata
Xerophyllum asphodeloides

Decatur
Bumelia thornei
Carex dasycarpa
Croomia pauciflora
Epidendrum conopseum
Illicium floridanum
Litsea aestivalis
Lythrum curtissii
Myriophyllum laxum
Physostegia leptophylla
Sageretia minutiflora
Schisandra glabra
Silene polypetala
Torreya taxifolia
Veratrum woodii

DeKalb
Allium speculae
Amphianthus pusillus
Cypripedium acaule
Cypripedium calceolus
Hexastylis shuttleworthii var. *harperi*
Isoetes melanospora
Nestronia umbellula
Schisandra glabra
Sedum pusillum
Veratrum woodii
Waldsteinia lobata

Dodge
Marshallia ramosa
Sarracenia minor
Sarracenia flava

Dooly
Oxypolis canbyi
Ptilimnium nodosum

Dougherty
Carex dasycarpa
Sarracenia minor
Schwalbea americana
Stylisma pickeringii

Douglas
Amphianthus pusillus
Cypripedium acaule
Cypripedium calceolus
Hexastylis shuttleworthii var. *harperi*
Schisandra glabra
Waldsteinia lobata

Early
Bumelia thornei
Cacalia diversifolia
Carex baltzellii
Carex dasycarpa
Epidendrum conopseum
Lythrum curtissii
Matelea alabamensis
Myriophyllum laxum
Pinguicula primuliflora
Rhododendron prunifolium
Salix floridana
Sarracenia leucophylla
Sarracenia minor
Sarracenia psittacina
Sarracenia rubra
Schwalbea americana
Trillium reliquum
Veratrum woodii

Echols
Epidendrum conopseum
Sarracenia flava
Sarracenia minor

Jackson
(No records)

Jasper
Cypripedium acaule
Quercus oglethorpensis

Jeff Davis
Balduina atropurpurea
Elliottia racemosa
Epidendrum conopseum
Evolvulus sericeus
Marshallia ramosa
Penstemon dissectus
Sarracenia flava
Sarracenia minor
Sarracenia psittacina

Jefferson
Penstemon dissectus
Sarracenia rubra

Jenkins
Oxypolis canbyi
Sarracenia flava

Johnson
Marshallia ramosa
Penstemon dissectus
Sarracenia flava

Jones
Trillium reliquum

Lamar
(No records)

Lanier
Epidendrum conopseum
Sarracenia flava
Sarracenia minor
Sarracenia psittacina

Laurens
Elliottia racemosa
Sarracenia flava
Sarracenia minor
Scutellaria ocmulgee

Lee
Asplenium heteroresiliens
Oxypolis canbyi
Sarracenia leucophylla
Sarracenia minor
Sarracenia purpurea ?
Stewartia malacodendron
Trillium reliquum

Liberty
Balduina atropurpurea
Bumelia thornei
Carex dasycarpa
Physostegia leptophylla
Sarracenia minor
Stewartia malacodendron

Lincoln
Hymenocallis coronaria

Long
Balduina atropurpurea
Elliottia racemosa
Fothergilla gardenii
Litsea aestivalis
Matelea pubiflora
Sarracenia minor

Lowndes
Epidendrum conopseum
Sarracenia flava
Sarracenia minor

Lumpkin
Carex manhartii
Cypripedium acaule
Cypripedium calceolus
Xerophyllum asphodeloides

Macon
Fothergilla gardenii
Hexastylis shuttleworthii var. *harperi*
Sarracenia rubra
Trillium reliquum

Madison
Cypripedium acaule
Hexastylis shuttleworthii var. *harperi*

Marion
Chamaecyparis thyoides
Chrysopsis pinifolia
Nestronia umbellula
Sarracenia rubra

McDuffie
(No records)

McIntosh
Epidendrum conopseum
Litsea aestivalis
Matelea pubiflora
Physostegia leptophylla
Sageretia minutiflora
Sarracenia minor

Meriwether
Amphianthus pusillus

Miller
Bumelia thornei
Cacalia diversifolia
Epidendrum conopseum
Litsea aestivalis
Lythrum curtissii
Schwalbea americana

Mitchell
Sarracenia flava
Sarracenia minor
Sarracenia psittacina

Monroe
(No records)

Montgomery
(No records)

Morgan
Cypripedium acaule
Schisandra glabra
Waldsteinia lobata

Murray
Carex purpurifera
Cypripedium acaule
Cypripedium calceolus
Hydrastis canadensis
Xerophyllum asphodeloides

Muscogee
Arabis georgiana
Croomia pauciflora
Hymenocallis coronaria
Nestronia umbellula
Rhus michauxii
Sarracenia rubra
Sedum nevii
Sedum pusillum
Stylisma pickeringii
Trillium reliquum

Newton
Amphianthus pusillus
Isoetes melanospora
Rhus michauxii

Oconee
(No records)

Oglethorpe
Amphianthus pusillus
Cypripedium acaule
Nestronia umbellula
Quercus oglethorpensis
Sedum pusillum

Paulding
Cypripedium calceolus
Schisandra glabra

Peach
Chamaecyparis thyoides
Hexastylis shuttleworthii var. *harperi*
Nestronia umbellula
Sarracenia rubra

Pickens
Cypripedium acaule
Cypripedium calceolus
Waldsteinia lobata

Pierce
Sarracenia minor

Pike
Amphianthus pusillus

Amphianthus pusillus Torrey

Little Amphianthus, Pool Sprite, Snorkelwort

Figwort Family, SCROPHULARIACEAE

LEGAL STATUS:
State: THREATENED
Federal: THREATENED

SYNONYMY: None in current usage.

RANGE: Piedmont Plateau from Alabama to South Carolina. Recorded from 17 counties in Georgia (see map).

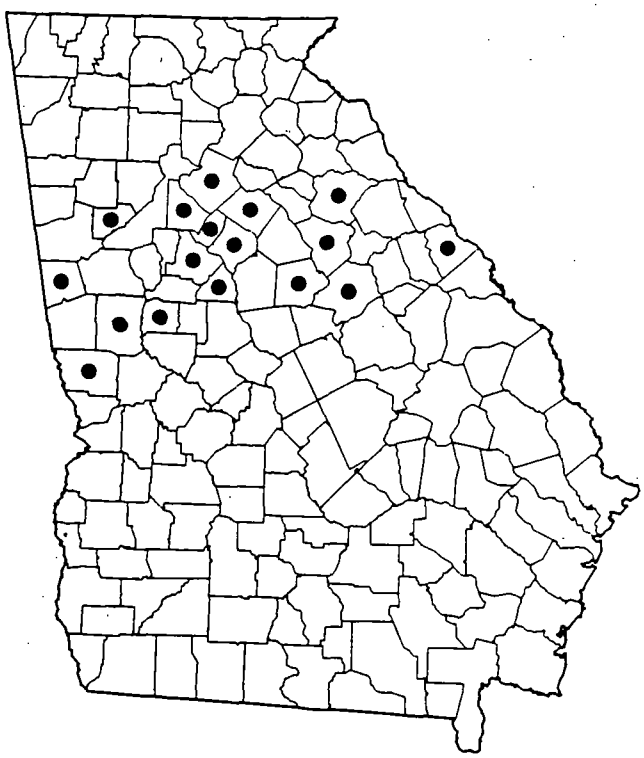
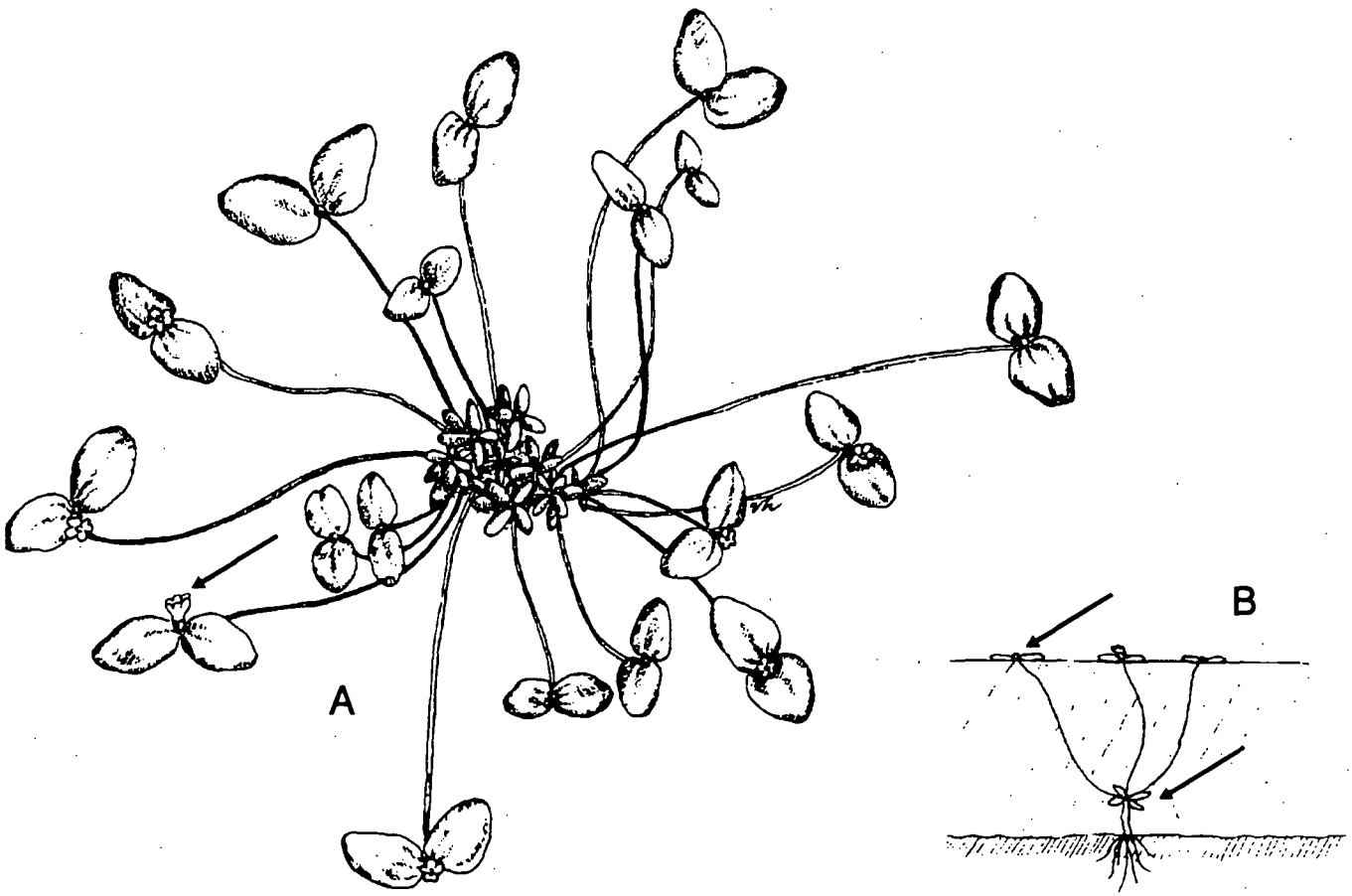


ILLUSTRATION: (A) plant habit, top view, with two types of leaves, 2×; note tiny flower; (B) profile sketch of plant in standing water, 0.75×; note floating leaves in pairs and submerged leaves in a rosette. Source: original drawing by Vicky Holifield.

DESCRIPTION: Annual herb. This is a diminutive plant easily overlooked. It has both floating and submerged leaves. The floating leaves are paired, ovate, 4–8 mm long, 3–5 mm wide, and attached to the submerged plant base by threadlike stems. The submerged leaves are clustered atop a short (6 mm or less) stem, are lanceolate, and less than



1 cm long. The flowers are small, inconspicuous, white to pale violet, and found both among the submerged leaves and between the floating surface leaves. The fruit is a shallowly bilobed capsule, 1–2 mm long, 2–3 mm broad, with a few seeds that are oblong, slightly curved, about 1 mm long, and dark brown to black. **Flowering period:** March to April; **fruiting period:** April to May. **Best search time:** during flowering or fruiting, since plants disintegrate rapidly after fruiting.

HABITAT: Restricted to shallow, flat-bottomed depressions on granitic outcrops, where water collects after a rain. These depressions are less than one foot in depth, are entirely rock-rimmed, and usually contain soil at least 2 cm deep. They may be dry much of the summer, except during rainy periods. The depressions, sometimes called vernal pools, solution pits or weather pits, are formed naturally by erosion over millions of years.

SPECIAL IDENTIFICATION FEATURES: No other Georgia plant resembles pool sprite when in flower. Water starwort (*Callitriche heterophylla*) may be an associate, especially in less pristine pools, and also produces two types of leaves. The water starwort has longer, leafier stems, and, toward the upper stem, the leaves tend to form a floating rosette. The underwater leaves of *Amphianthus* only form a rosette atop a short seedling stem (see illustration). The floating leaves of *Amphianthus* are in single pairs, terminating a delicate, threadlike stem.

MANAGEMENT RECOMMENDATIONS: Because the microhabitat of *Amphianthus* is naturally quite stable—very slow to undergo change—*Amphianthus* is not adapted to withstand any habitat modification. Therefore avoid disturbance of any kind, such as from grazing animals or vehicular traffic.

REMARKS: Melines Conklin Leavenworth (1796–1862) made the first collection of this species in 1836, in Newton or Rockdale County. Leavenworth was an army surgeon and talented amateur botanist, in whose honor John Torrey named the genus of another of our protected plants, least gladecress (*Leavenworthia exigua*). *Amphianthus pusillus* is the sole species within the genus (monotypic genus). After extensive searches it has been found at about 65 localities, the vast majority of them with only one or two small pools (with areas of 1–2 square meters) that support it. At least eight populations have been eradicated, mostly through quarrying of granite outcrops, its sole habitat. *Amphianthus* is rare throughout its range and is suffering continued habitat loss.

SELECTED REFERENCES:

Allison, J. R. 1993. Recovery plan for three granite outcrop plant species. United States Fish and Wildlife Service, Jackson, Mississippi. 41 pp.

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McVaugh, R. 1943. The vegetation of the granitic flatrocks of the southeastern United States. Ecological Monographs 13:119–166.

McVaugh, R. and J. H. Pyron. 1937. The distribution of *Amphianthus* in Georgia. Castanea 2:104–105.

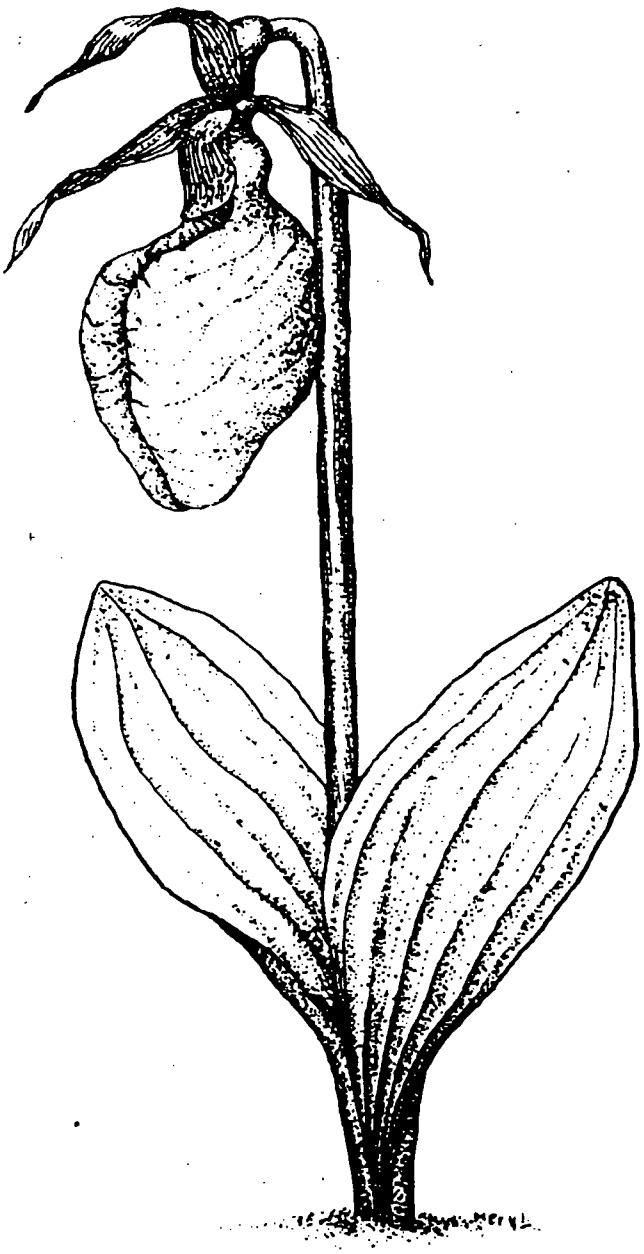
Pennell, F. W. 1935. The Scrophulariaceae of Eastern Temperate North America. Monograph Number 1. Academy of Natural Sciences of Philadelphia. 650 pp.

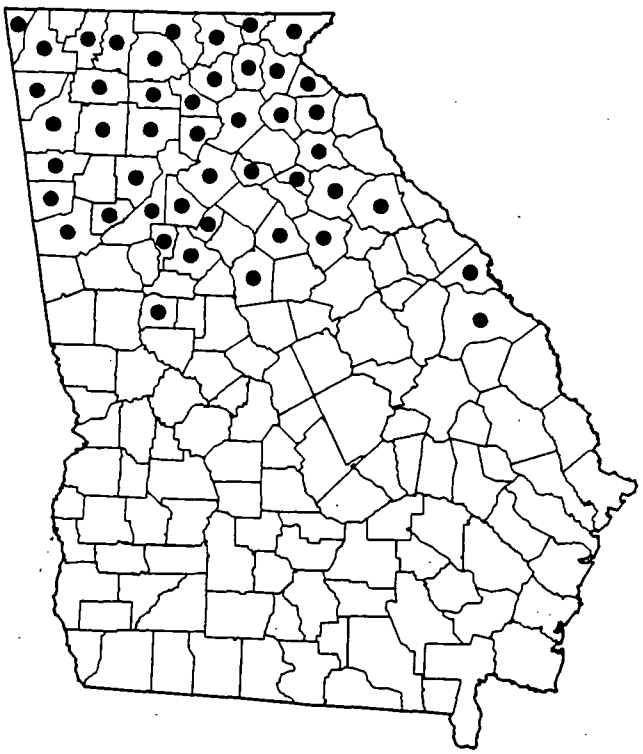
Radford, A. E., H. E. Ahles, and C. R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press, Chapel Hill. 1183 pp.

Cypripedium acaule Aiton

Moccasin Flower, Pink Ladyslipper

Orchid Family, ORCHIDACEAE





LEGAL STATUS:
State: UNUSUAL
Federal: None

SYNONYMY: None in current usage.

RANGE: Foothills and mountains of Alabama, Georgia, South Carolina, adjacent Tennessee, and North Carolina, north to Canada. Recorded from 46 counties in Georgia (see map).

ILLUSTRATION: plant habit, showing basal pair of leaves and single, moccasin-like flower, 1×. Source: Natural Resources Defense Council (1985), drawn by Meryl Lee Hall and used with permission.

DESCRIPTION: Perennial herb. This is a showy plant up to 45 cm tall. It has two basal leaves that are hairy, with strongly raised, longitudinal veins, green above, gray beneath, and up to 24 cm long and 14 cm wide. The single flower is on a leafless flower stalk (scape) that extends well above the leaves. Two of the petals are green, and the third, the lip petal, is pink (rarely white), showy, 4–6 cm long, 2.5–3.5 cm wide, and shaped like a

"slipper" or a "moccasin." The fruit is an ellipsoid capsule, 3–4 cm long, containing dustlike seeds. **Flowering period**: April to June; **fruiting period**: May to July. **Best search time**: during flowering and fruiting, since plants become dormant soon after fruiting.

HABITAT: Found in acid soils of pinelands, upland hardwoods with pine, occasionally on the edges of rhododendron thickets, and in mountain bogs.

SPECIAL IDENTIFICATION FEATURES: Pink ladyslipper is easily recognized in flower, fruit, or leaf. Leaves are paired in flowering individuals, otherwise single, produced at ground level, and uniformly covered with coarse, sticky hairs. They have typical monocot venation (major veins parallel to the leaf margin), in this species forming longitudinal ridges.

MANAGEMENT RECOMMENDATIONS: Avoid disturbance. This species may require periodic forest thinning and winter burns at several-year intervals to maintain its pine-dominated habitat. Otherwise, the forest habitat may develop into a stand with too much shade or too many hardwoods. Of horticultural interest: protect from removal by irresponsible persons. Control exotic weeds, especially Japanese honeysuckle.

REMARKS: Among the plants protected by law in Georgia are a few that are not particularly rare, but have a history of exploitation that raises concern about their future. Orchids and carnivorous plants such as pitcherplants have many devotees, not all of whom exhibit a well-developed conservation ethic. Unscrupulous or thoughtless collectors and nurserymen have wiped out whole populations of these plants. Sadly, although huge quantities of *Cypripedium acaule* have been dug and offered for sale, the plants are seldom provided conditions that mimic their natural habitat well enough to result in their survival. The listing of species such as this one is done to regulate commerce in them and to protect them on public lands. For the above reasons, the Georgia Natural Heritage Program does not need to be informed of every occurrence in the state of this species. We are quite interested, however, in records from additional counties or information about large populations (100 or more flowering plants).

SELECTED REFERENCES:

Case, F. W., Jr. 1987. Orchids of the Western Great Lakes Region. Revised Edition. Cranbrook Institute of Science Bulletin 48. 251 pp.

Duncan, W. H. and L. E. Foote. 1975. Wildflowers of the Southeastern United States. University of Georgia Press, Athens. 296 pp.

Luer, C. A. 1975. The Native Orchids of the United States and Canada Excluding Florida. New York Botanical Garden, Bronx. 363 pp.

Natural Resources Defense Council. 1985. Wildflowers in the Garden. Circulated brochure, Plant Conservation Project, Washington, D.C. 8 pp.

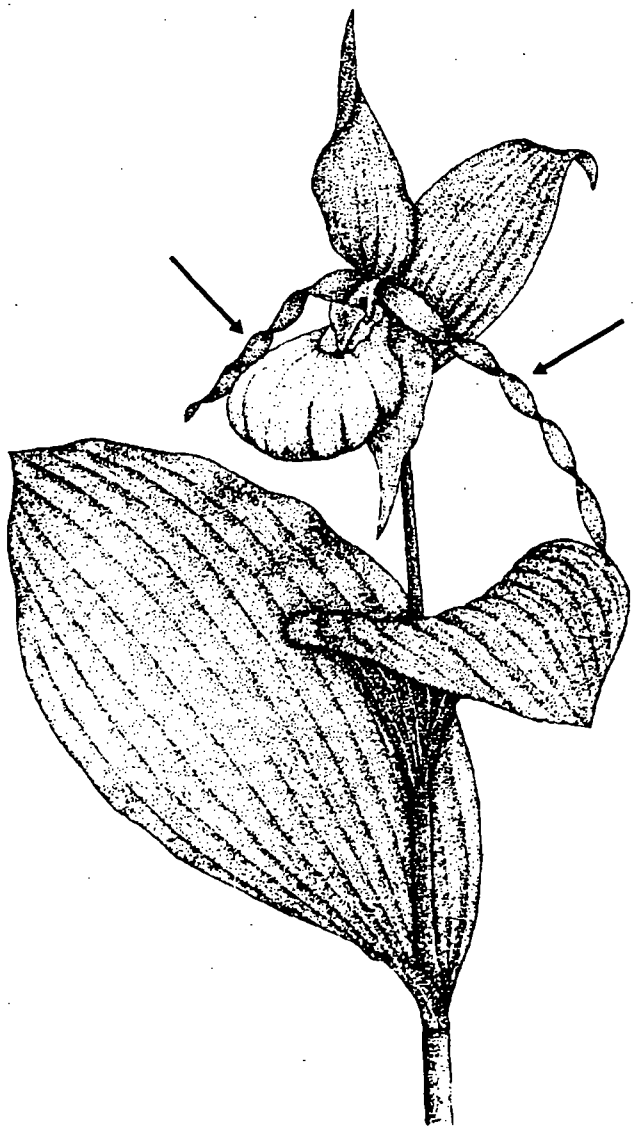
Radford, A. E., H. E. Ahles, and C. R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press, Chapel Hill. 1183 pp.

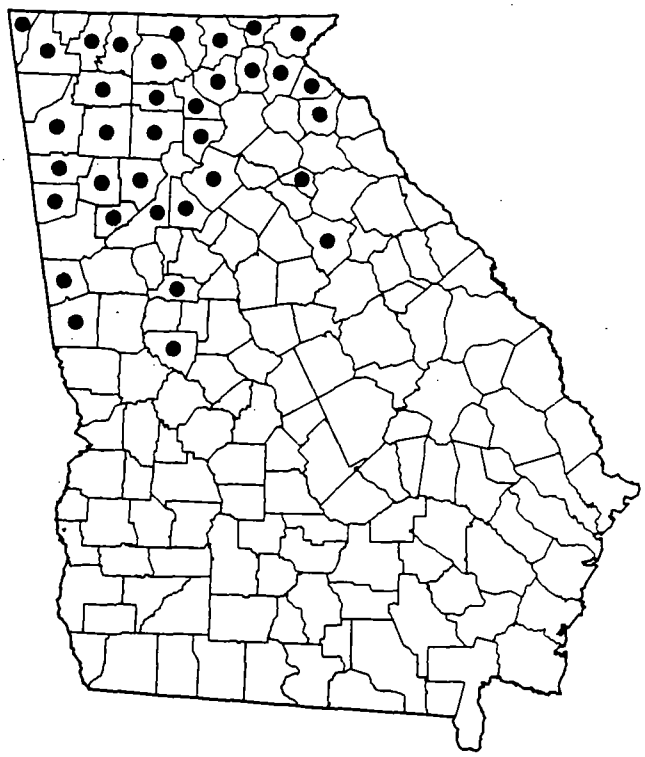
Rickett, H. W. 1966. Wild Flowers of the United States. Volume 2. The Southeastern States. McGraw-Hill, New York. 688 pp.

Cypripedium calceolus Linnaeus

Golden Slipper, Yellow Ladyslipper

Orchid Family, ORCHIDACEAE





LEGAL STATUS:
State: UNUSUAL
Federal: None

SYNONYMY: *Cypripedium calceolus* Linnaeus is the name applied to all yellow ladyslippers in Georgia under provisions of Georgia's Wildflower Preservation Act. Other botanical names in current usage for the yellow ladyslippers of Georgia are:

Cypripedium calceolus subsp. *parviflorum* (Salisbury) Hultén
Cypripedium calceolus var. *parviflorum* (Salisbury) Fernald
Cypripedium calceolus var. *pubescens* (Willdenow) Correll
Cypripedium parviflorum Salisbury
Cypripedium parviflorum var. *pubescens* (Willdenow) Knight
Cypripedium pubescens Willdenow

RANGE: Foothills and mountains of Georgia and the Carolinas, west to Arizona, and north to Canada. Recorded from 35 counties in Georgia (see map).

ILLUSTRATION: upper flowering stem; note descending, twisted lateral petals; 1 x . Source:

Wofford (1989), drawn by José Panero and used with permission.

DESCRIPTION: Perennial herb. Yellow ladyslipper is a showy plant up to 70 cm tall. The 3–5 leaves are alternate, hairy, prominently ribbed or veined, green above and beneath, and up to 20 cm long and 10 cm wide. The one or two flowers are terminal, with two green, purplish-streaked or entirely madder-purple, twisted lateral petals, and a yellow "slipper" (lip petal), spotted purple on the inside. The flowers are fragrant, ranging from lemony to vanilla-scented; they may vary in size of the "slipper" from 1.5–6.5 cm long, and 1.2–3.5 cm wide. The fruit is an ellipsoid capsule, to 5 cm long, conspicuously covered with small hairs, and containing an estimated 10,000 dustlike seeds. **Flowering period:** April to June; **fruiting period:** May to July. **Best search time:** during flowering and fruiting, since plants become dormant soon after fruiting.

HABITAT: Found in rich, moist, hardwood coves and forests.

SPECIAL IDENTIFICATION FEATURES: Yellow ladyslipper is easily recognized in flower, fruit, or leaf. Leaves and stems are conspicuously hairy; the hairs are straight, soft, and sticky. The leaf veins are parallel to the leaf margin, and form longitudinal ridges. Sterile specimens could be confused with pink ladyslipper, but yellow ladyslipper grows in damper, richer woods and produces an above-ground leafy stem. The small-flowered yellow ladyslipper (var. *parviflorum*) is separated from the large-flowered yellow ladyslipper (var. *pubescens*) by several seemingly variable characters, including: (1) the lip or pouch is less than 2.5 cm long; (2) the flowers are sweeter, like vanilla rather than lemony; and (3) the twisted lateral petals are entirely madder-purple and glossy, rather than dull and streaked with purple or entirely green.

MANAGEMENT RECOMMENDATIONS: Avoid disturbance. This species will tolerate hand thinning of shading trees in its vicinity, at most. Of horticultural interest: protect from removal by irresponsible persons.

REMARKS: The plants of the genus *Cypripedium* are often called ladyslippers, but might better be called Venus' slippers, for the name comes from the Latin *Cypris*, "Venus" and *pedilon*, "shoe." Although there are roughly 35 species of the genus worldwide, the typical variety of this species (var. *calceolus)* is the only *Cypripedium* native to western Europe. The plant is legally protected in Great Britain—perhaps literally *the plant* because there is reportedly only a single wild individual remaining there due to over-collecting! Of the two varieties that grow in Georgia, var. *parviflorum* is truly rare. This species is protected to ensure that the situation in Britain is not repeated in Georgia (see also the remarks for *C. acaule*).

SELECTED REFERENCES:

Case, F. W., Jr. 1987. Orchids of the Western Great Lakes Region. Revised Edition. Cranbrook Institute of Science Bulletin 48. 251 pp.

Case, M. A. 1993. High levels of allozyme variation within *Cypripedium calceolus* (Orchidaceae) and low levels of divergence among its varieties. Systematic Botany 18:663–677.

Duncan, W. H. and L. E. Foote. 1975. Wildflowers of the Southeastern United States. University of Georgia Press, Athens. 296 pp.

Luer, C. A. 1975. The Native Orchids of the United States and Canada Excluding Florida. New York Botanical Garden, Bronx. 363 pp.

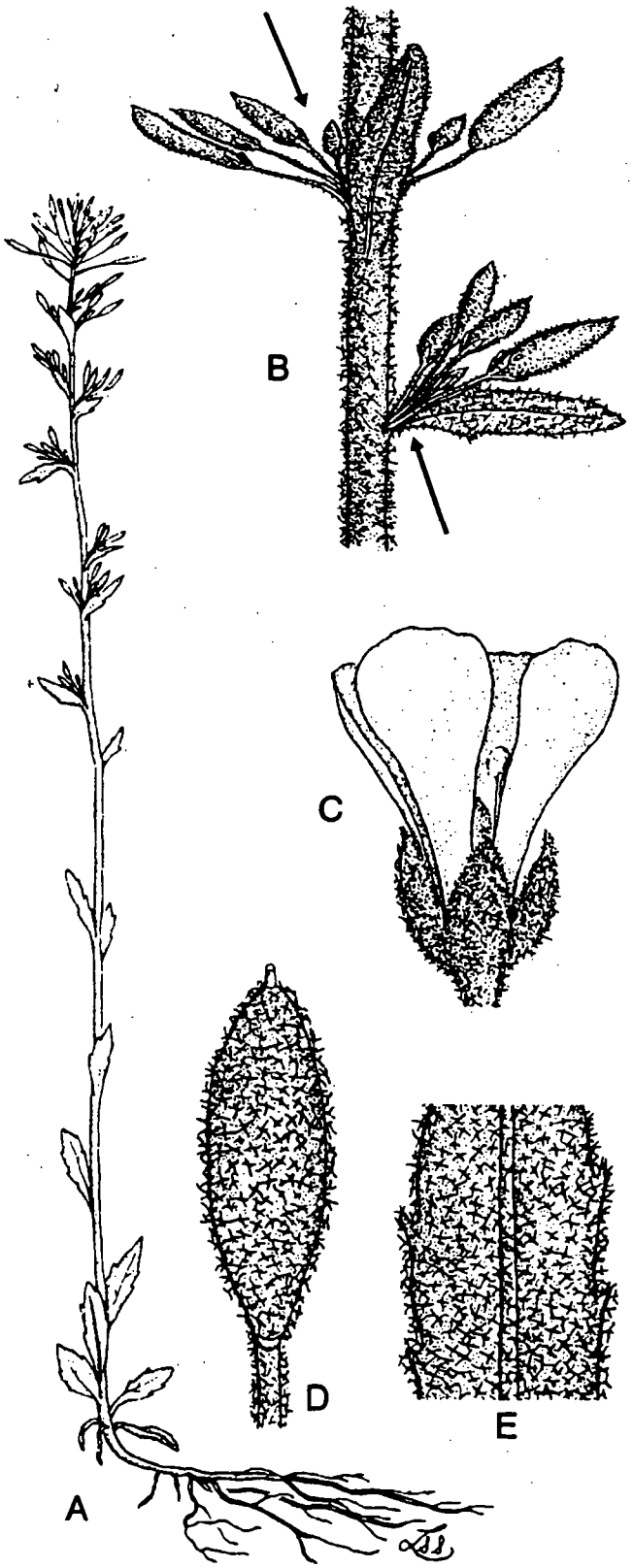
Radford, A. E., H. E. Ahles, and C. R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press, Chapel Hill. 1183 pp.

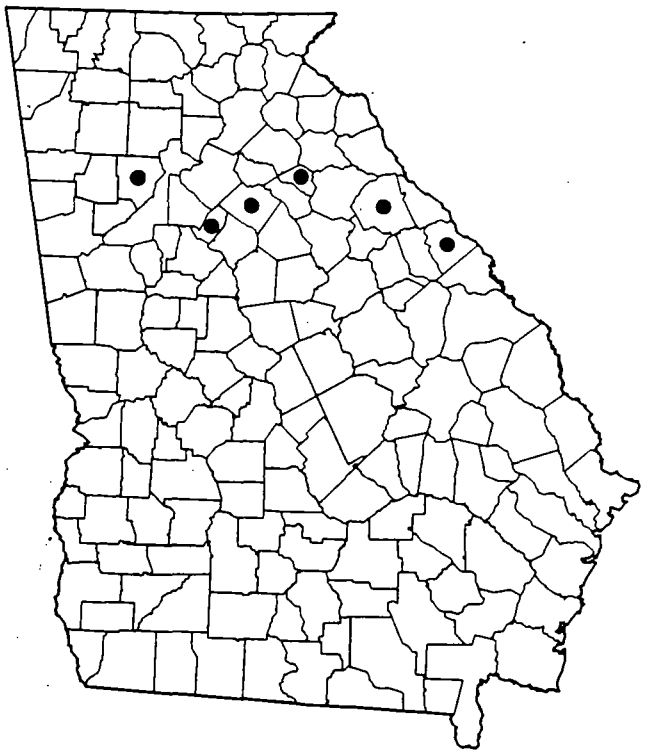
Rickett, H. W. 1966. Wild Flowers of the United States. Volume 2. The Southeastern States. McGraw-Hill, New York. 688 pp.

Wofford, B. E. 1989. Guide to the Vascular Plants of the Blue Ridge. University of Georgia Press, Athens. 384 pp.

Draba aprica Beadle

Sun-loving Draba, Open-ground Draba, Granite Whitlow-grass — Mustard Family, BRASSICACEAE





LEGAL STATUS:
State: ENDANGERED
Federal: None

SYNONYMY: None in current usage.

RANGE: Ozark Plateau of Arkansas and southern Missouri; disjunct in the Piedmont of Georgia and South Carolina. Recorded from six counties in Georgia (see map).

ILLUSTRATION: (A) plant habit, 1×; (B) stem, upper portion, with fruit clusters in leaf axils, 3×; (C) flower, profile, 15×; (D) fruit, 10×; note tiny branched hairs; (E) leaf, underside, 15×, also with tiny branched hairs. Source: Gaddy (1980), drawn by Susan Sizemore and used with permission.

DESCRIPTION: annual herb. *Draba aprica* is 8–20 cm tall; the stems, leaves, sepals, and fruits are covered with tiny, branched, stalkless hairs (best seen with 10× lens). The basal leaves are narrowly obovate, elliptic, or lanceolate, have 1–2 teeth per side, and are 1.5–3.0 cm long; the stem leaves are alternate, widely spaced, and similar in size and shape to the basal leaves. The flowers

are produced at the leaf bases in congested, axillary clusters and also terminally. The four white petals are up to 3 mm long, and rounded to slightly notched at the apex. The fruit is a bivalved pod, narrowly ellipsoid, 2–6 mm long, 0.8–1.2 mm wide, covered with minute, branched or star-shaped hairs (must use 10× hand lens). **Flowering period:** March to April; **fruiting period:** April to May. **Best search time:** during fruiting, since branched hairs on fruits are diagnostic.

HABITAT: Found in shallow soils on granitic outcrops, especially beneath widely scattered, old-growth eastern redcedar (*Juniperus virginiana*).

SPECIAL IDENTIFICATION FEATURES: On Georgia's granitic outcrops there are three drabas. Vernal whitlow-grass (*Draba verna* or *Erophila verna*), has basal leaves only, strongly notched (cleft) petals, and broader (2–3 mm), smooth fruits. Short-fruited draba (*D. brachycarpa*) closely resembles *D. aprica*, but has smooth fruit (lacking hairs), tends to branch more freely, and produces more elongated axillary flower clusters (the axillary branchlets well over 1 cm in length). In contrast, *D. aprica* has fruits covered with branched hairs, and has congested axillary flower clusters (the axillary branchlets 1 cm or less in length).

MANAGEMENT RECOMMENDATIONS: Control exotic weeds, especially Japanese honeysuckle.

REMARKS: This species was first collected in 1819 from Arkansas by Thomas Nuttall, and described as *Draba brachycarpa* var. *fastigiata* in 1838. Nuttall (1786–1859) was a Philadelphia botanist and ornithologist who discovered many new species of plants, especially in the midwestern states. In 1901 collectors of the Biltmore Herbarium collected a *Draba* at Kennesaw Mountain National Battlefield Park, Cobb County, Georgia; C. D. Beadle described *D. aprica* in 1913, based on this collection. In 1961 the foremost American authority on the mustard family, Reed C. Rollins, suggested that both names represented the same, distinct species. The accepted name, therefore, is *D. aprica*, the first (and only) name for the plant published previously at the level of species. It is probable that most of the fruits produced by this species are the product of self-fertilization rather than cross-pollination. Even when the tiny flowers are at their most conspicuous they would appear to be poor attractants to insect visitors. The more so since plants of this species seldom form the dense patches common with some other granite outcrop plants, such as granite stonecrop (*Sedum pusillum*). Such cross-pollination as does occur surely takes place mostly early in the flowering season, for the petals tend to be best developed on the earlier flowers of an individual plant. As the brief flowering season progresses, the petals of the newer flowers tend to be progressively shorter, and by late in the season the flowers lack petals altogether. In the smallest plants petals may not develop at all. *Draba aprica* is rare throughout its range. In the Southeast it is known from only nine sites in Georgia and approximately three in South Carolina. Several of these populations face imminent peril. It is slightly more abundant on the Ozark Plateau. *Draba aprica* is a rare disjunct in Georgia, one that has sustained significant habitat loss in the Southeast due chiefly to quarrying of granite outcrops.

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Hexastylis shuttleworthii var. *harperi* Gaddy

Harper Wild Ginger, Bog Heartleaf, Callaway Ginger

Birthwort Family, ARISTOLOCHIACEAE

LEGAL STATUS:
State: UNUSUAL
Federal: None

SYNONYMY: None in current usage, although the genus *Hexastylis* is often placed within the genus *Asarum*.

RANGE: Coastal Plain of Alabama and Georgia, and Piedmont Plateau of Georgia nearly to South Carolina. Recorded from 20 counties in Georgia (see map), including one unauthenticated record based on an inadequate (sterile) specimen from Wilkinson County.

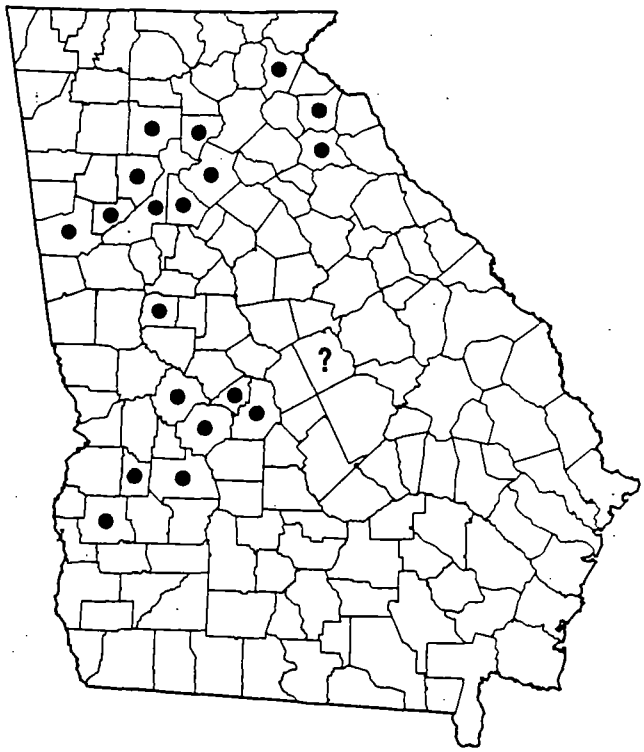
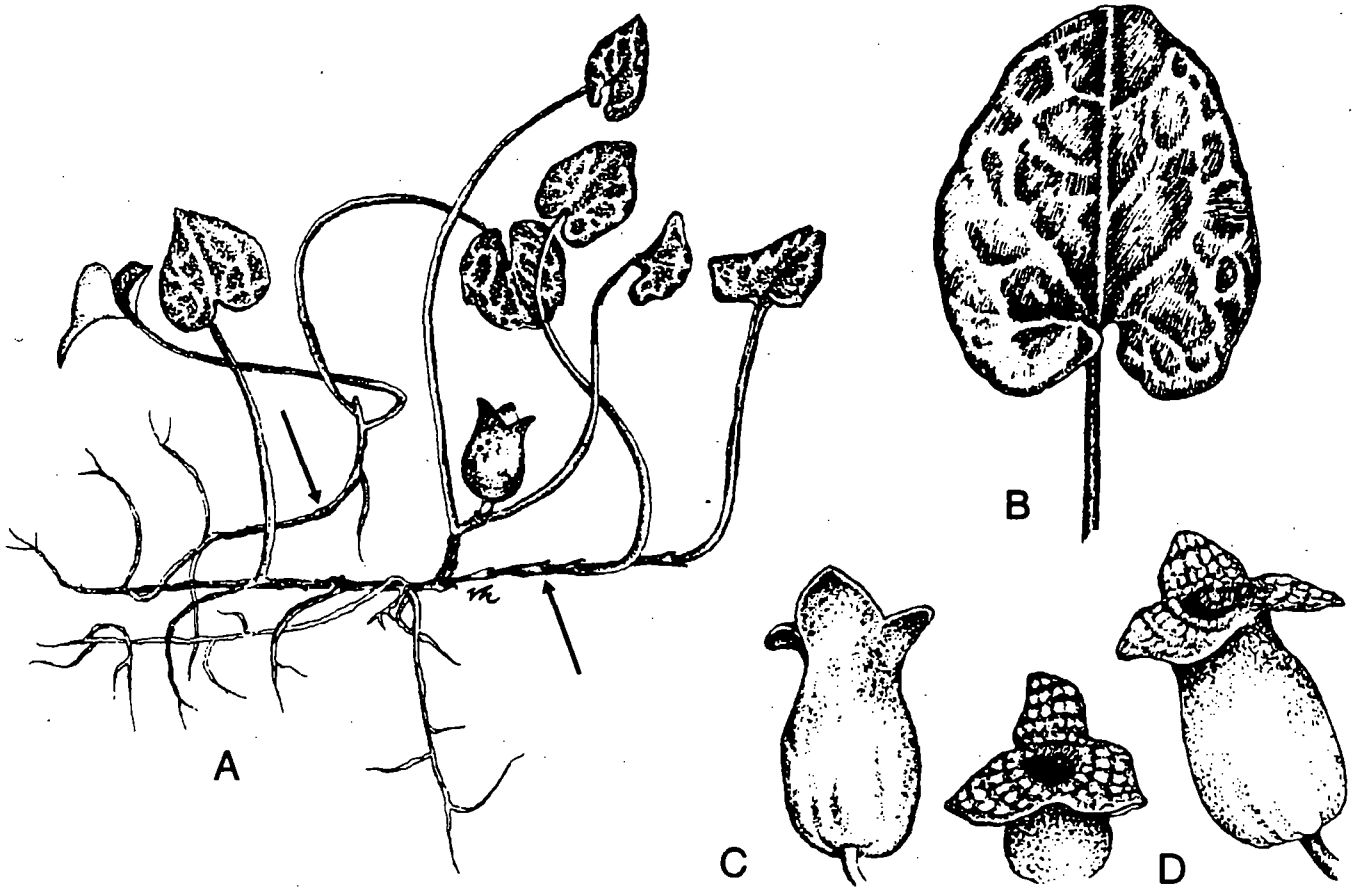


ILLUSTRATION: (A) plant habit, with leaves scattered along cord-like rhizomes, 0.5×; (B) mottled leaf, with the base heart-shaped (cordate), 1.3×; (C) flower, side view, 2×; (D) flowers, top view, showing network pattern on inner surface of sepals, 2×. Source: original drawing by Vicky Holifield.



DESCRIPTION: Perennial herb forming a patchy, evergreen groundcover, and producing a strong ginger scent when crushed. The stems are shallowly buried, whitish, cord-like rhizomes, which produce leaves and additional branches so profusely that small (1–3 m^2) mats of groundcover are produced. The leaves are evergreen, leathery, strongly variegated (usually along the veins on the upper surface of the leaves), heart-shaped (cordate) to rounded, 2.5–7.0 cm long and nearly as wide. The flowers are produced near the ground, usually beneath the litter layer, and are solitary in leaf axils. The shape and size of the flower are crucial for identification. The flowers are urn-shaped (urceolate) to somewhat bell-shaped (campanulate) with three conspicuously patterned, spreading calyx lobes (see illustration). There is only a slight flare to the calyx, which is 15–25 mm long, and half to nearly as wide. The lobes are triangular, 6–13 mm long, 10–22 mm wide at the base, and display a regularly ridged network (reticulation) on the inner surface (see illustration). Petals are lacking, and the 12 stamens are fused to the side of the single, 6-chambered ovary. The tissue between the pollen sacs, the connective, extends beyond them, forming a short beak. The fruit is a capsule-like berry that splits irregularly, exposing up to 15 seeds that are 1.5–2.0 mm long, with white, oily appendages. **Flowering period**: March to early June; **fruiting period**: May to July. **Best search time**: all year, since the leaves are evergreen, but shape and size of the flowers are sometimes required for conclusive identification.

HABITAT: Found on peaty soils at edges of forested bogs on the Piedmont, and on moist hammocks and bases of bluff forest slopes along and within floodplain forests of the Coastal Plain.

SPECIAL IDENTIFICATION FEATURES: In Georgia, few heartleaf species occur on the Piedmont or Coastal Plain. *Hexastylis arifolia* is frequent throughout and has triangular to arrowhead-shaped leaves. *Hexastylis heterophylla* occurs in the northern Piedmont and mountains, and has flowers in which the tubular portion of the flower is cylindrical; the calyx tube therefore is unflared. *Hexastylis shuttleworthii* var. *shuttleworthii* is found mostly north of the range of var. *harperi* in thickets of mountain laurel (*Kalmia latifolia*) or rosebay rhododendron (*Rhododendron maximum*), and its larger (6-10 cm long) leaves persist mostly at the growing tips of the rhizomes. The var. *shuttleworthii* mostly appears as scattered clumps. In contrast, the var. *harperi* occurs in moister habitats than any other wild ginger, and its typically smaller (2.5-7.0 cm long) leaves are scattered along more branched rhizomes. The rhizomes of var. *harperi* tend to be closely intertwined, often forming an extensive groundcover.

MANAGEMENT RECOMMENDATIONS: Avoid disturbance. This species will tolerate only hand thinning of trees in its immediate vicinity, at most. Avoid drainage of site.

REMARKS: Roland Harper made the earliest known collection of this plant in 1927, in Autauga County, Alabama. However, it was not described as a distinct variety until 1987. Plants of unknown geographic origin have been in cultivation at Callaway Gardens since 1965, under the name *Hexastylis shuttleworthii* 'Callaway' (Galle, 1984). *Hexastylis shuttleworthii* var. *harperi* is rare throughout its range and has sustained significant habitat loss due to draining or filling of its habitat.

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Nestronia umbellula Rafinesque

Indian Olive, Conjurer's Nut, Nestronia

Sandalwood Family, SANTALACEAE

LEGAL STATUS:
State: THREATENED
Federal: None

SYNONYMY: None in current usage.

RANGE: Piedmont and Inner Coastal Plain from Alabama to southern Virginia; disjunct on the Highland Rim of central Tennessee. Recorded from 15 counties in Georgia (see map).

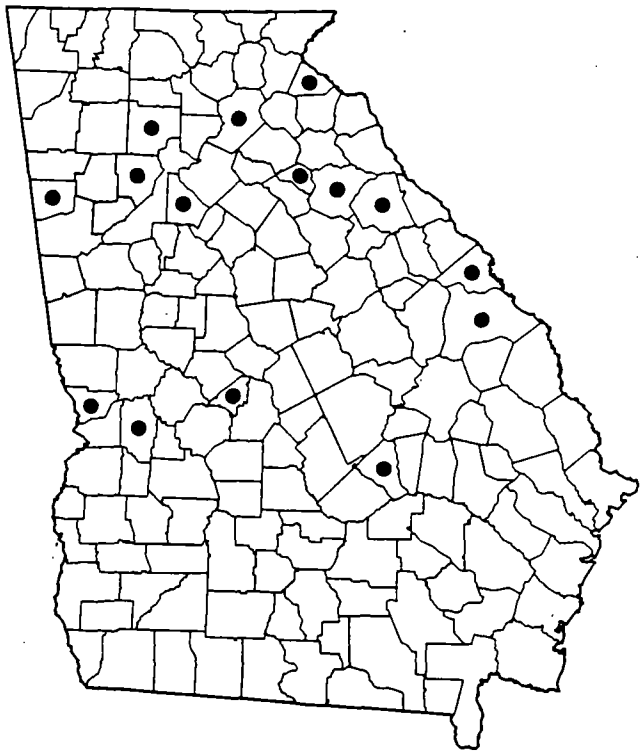
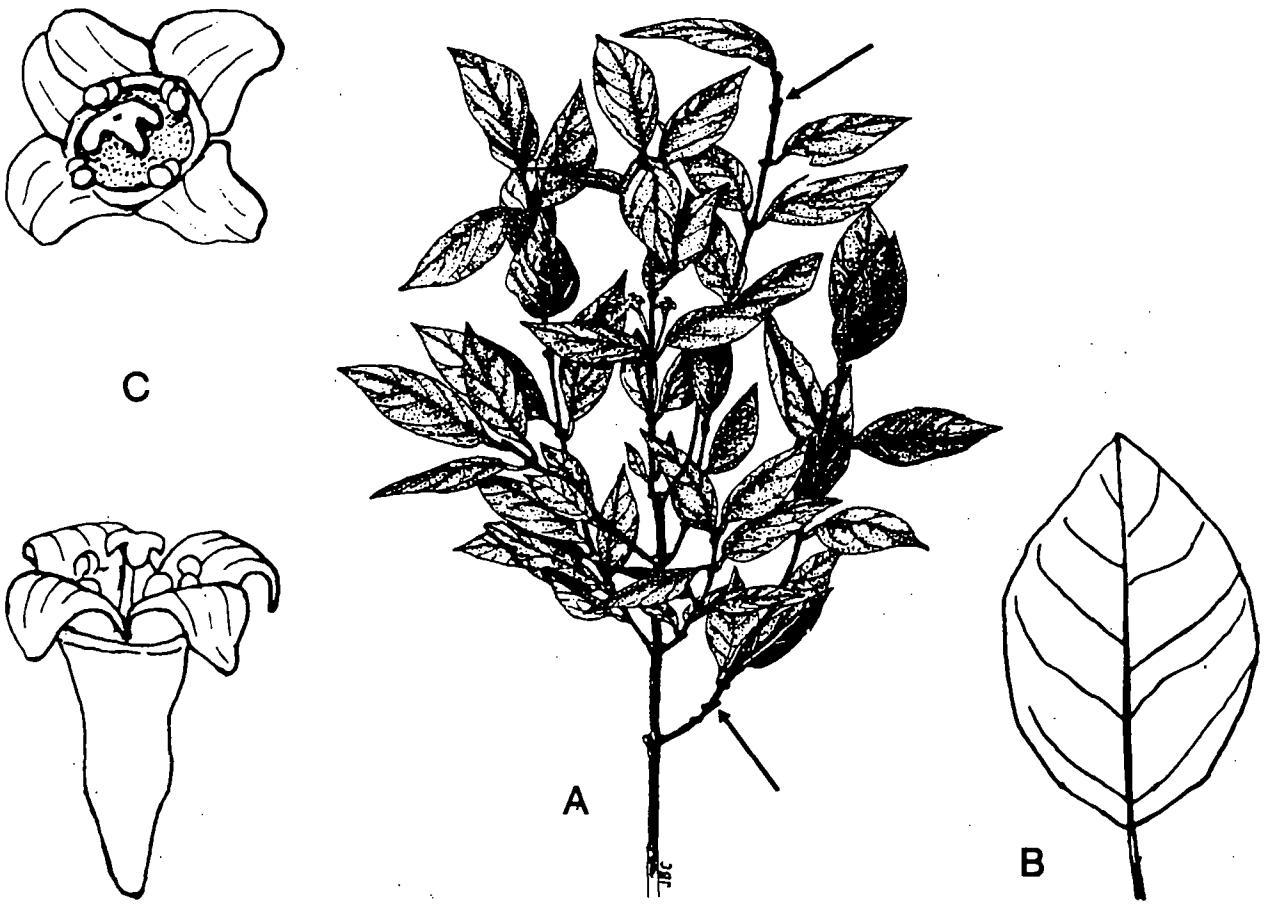


ILLUSTRATION: (A) branch, with opposite leaves, and single, axillary, female flowers, 0.3 ×; note pairs of opposite buds where leaves have fallen; (B) leaf, 1 ×; (C) female flower, two views, 8 ×. Source: Knox and Sharitz (1990), drawn by Jean B. Coleman and used with permission.

DESCRIPTION: Deciduous shrub. Nestronia is a small, colonial shrub, 0.6–1.3 m tall. The young branches are smooth, shiny, and dark purplish-green to chestnut brown. The leaves are opposite, and when a twig is viewed end-on the leaves appear in a single plane in two distinct, opposite



rows (2-ranked). The leaves are narrowly ovate to elliptic, 3–6 cm long, about half as wide, pale green, smooth, and pointed. Male and female flowers are produced on different plants (dioecious). The female flowers are solitary and the male flowers are in tight clusters (umbels) of 3–11 flowers, both types arising from the axils of the leaves. The petals on the male and female flowers are absent; however, the 4–5 sepals are petal-like, greenish-yellow to maroon, and less than 3 mm long. The fruit is an olive-shaped drupe, 13–15 mm in diameter, and greenish-yellow, the sepal lobes persistent at the apex. **Flowering period:** April to May; **fruiting period:** July. **Best search time:** during growing season, since twigs and leaves are diagnostic.

HABITAT: Found in dry, open, upland forests of mixed hardwood and pine.

SPECIAL IDENTIFICATION FEATURES: *Nestronia* grows in dense clumps resembling, but slightly taller than, the common lowbush blueberry (*Vaccinium pallidum*, including plants sometimes known as *V. vacillans*). The 2-ranked, opposite leaves with a pale green color on shiny, purplish-green to chestnut brown twigs are diagnostic. The leaves fall early and plants become hidden in fallen litter. The buds are 1–3 mm long, about 1 mm wide, pointed, and dark blackish-brown, covered with 3–4 pairs of bud scales. The buds point outward, sometimes nearly at right angles to the twig. Each pair of dark buds is conspicuous on the naked winter twig. When a leaf is shed, it leaves a circular leaf scar at the base of the bud for next year's leaf. In contrast, lowbush blueberry has alternate, deep green leaves on green to greenish-brown twigs; its buds are greenish or reddish, and the subtending leaf scars on the winter twigs are crescent-shaped.

MANAGEMENT RECOMMENDATIONS: Hand thinning of shading trees in its vicinity, if done carefully, may be beneficial to this species.

REMARKS: William Bartram made the first recorded observation of this species in 1773, in Georgia. It was described in 1836. It is now known from about 16 locations in Georgia. The genus *Nestronia* consists of only this species. Like many of its relatives in the Santalaceae (e.g., buffalo nut), *Nestronia* is a hemiparasite. Such plants contain chlorophyll and make their own food, but are capable of parasitizing the roots of certain other plants when the opportunity presents itself. *Nestronia umbellula* is rare throughout its range and has sustained significant habitat loss due to clearing of forest land. Many of the remaining populations are of only a single sex, and thus are mostly able to reproduce by asexual root-sprouting. Dioecious species such as this one are especially vulnerable to fragmentation of their habitat. As a result of habitat loss, the distance between individuals—in the genetic sense—increases, lessening the likelihood that a pollinator will travel from an individual to one of the opposite sex.

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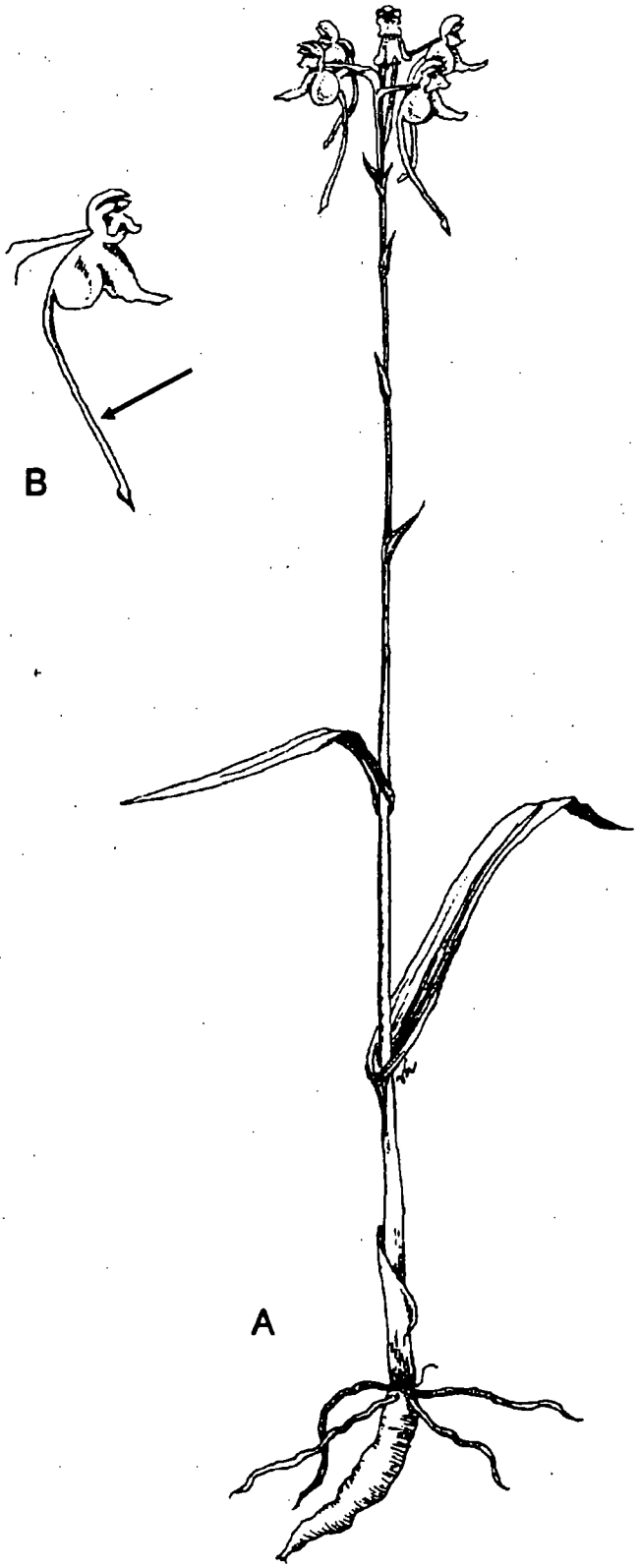
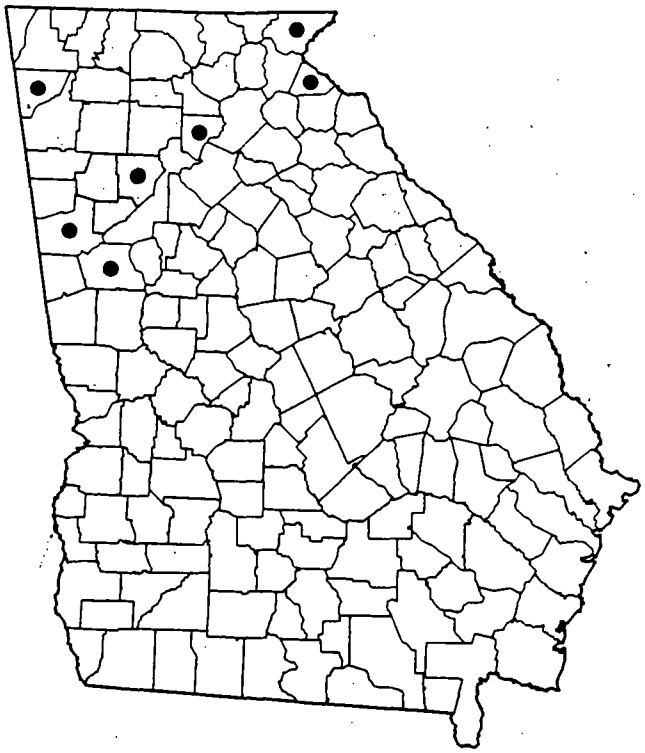
Platanthera integrilabia (Correll) Luer

Monkeyface Orchid, White Fringeless Orchid

Orchid Family, ORCHIDACEAE





LEGAL STATUS:
State: THREATENED
Federal: CANDIDATE

SYNONYMY:
Habenaria blephariglottis (Willdenow) Hooker var. *integrilabia* Correll
Habenaria correllii Cronquist

RANGE: Cumberland Plateau of northwestern Georgia and adjacent Alabama, north through Tennessee to southern Kentucky; Gulf Coastal Plain of central Mississippi and Alabama; also extremely scarce to extirpated in the Blue Ridge Mountains and foothills of the Piedmont Plateau in Georgia and the Carolinas, north to southwestern Virginia. Recorded from seven counties in Georgia (see map).

ILLUSTRATION: (A) plant habit, with both fibrous and tuberous roots and few-flowered inflorescence, 0.6×; (B) flower, side view, 1.2×; note long spur. Source: original drawing by Vicky Holifield.

DESCRIPTION: Perennial herb to 6 dm tall, from a cluster of fibrous roots and 1–few, tuberous,

fleshy roots (see illustration). The stem leaves number two or three, and are lanceolate, slightly folded along a strong central vein, up to 20 cm long and 3 cm wide, becoming bract-like near the top of the stem. Juvenile plants may have no aboveground stems and appear as single, strap-shaped leaves. The inflorescence is a loosely flowered, terminal cluster (raceme) with 6–15 pure white flowers. The flowers are white and bilaterally symmetrical, modified in a complex way for insect pollination. For our purposes, a lower lip (landing platform from an insect's vantage point) and a prominent spur (source of nectar for the insect) need to be distinguished. The lip is 13 mm long and 3–5 mm wide, with an entire to slightly and irregularly fringed margin. The downward-pointing spur is 4–5 cm long (see illustration). The fruit is an ellipsoid capsule, 15 mm long, 3 mm wide, with numerous, dustlike seeds. **Flowering period:** mid-July to late August; **fruiting period:** September to October. **Best search time:** during flowering, since a few other orchids in the same genus have similar leaves, making the flower essential for identification.

HABITAT: Found in red maple-blackgum swamps; along sandy, damp stream margins; or on seepy, rocky, thinly vegetated slopes. Common associates include green woodland orchid (*Platanthera clavellata*), white violet (*Viola primulifolia*), cowbane (*Oxypolis rigidior*), and grass-of-Parnassus (*Parnassia asarifolia*). In one bouldery gorge site, poison sumac (*Toxicodendron vernix*) grows overhead above seepy mounds of sphagnum moss and scattered grass-pinks (*Calopogon tuberosus*). The typical habitat is a seasonally wet, perched, sandy, springhead swamp dominated by red maple (*Acer rubrum*) and blackgum or swamp tupelo (*Nyssa biflora*).

SPECIAL IDENTIFICATION FEATURES: The only definitive way to identify the white fringeless orchid is to observe the flower. The long spur, the entire (or nearly so) margin of the lip, and the pure white color distinguish this orchid from any other native species. Typically, this orchid resides in deep shade and vegetative specimens with only strap-shaped basal leaves far outnumber flowering individuals.

MANAGEMENT RECOMMENDATIONS: Avoid drainage of site. Hand thinning of shading trees in its vicinity, if done carefully, may be beneficial to this species. Of horticultural interest: protect from removal by irresponsible persons.

REMARKS: The earliest collection of this species came from somewhere in Georgia, in 1840. The earliest mention in botanical literature dates to 1910. In 1941 Donovan S. Correll (1908–1983) formally described it as *Habenaria blephariglottis* var. *integrilabia*, distinguished from typical *H. blephariglottis* by its entire lip. Some authors, such as Correll, employ a broad concept of *Habenaria*, one that includes a group of species others recognize as a distinct genus, *Platanthera*. In 1975 Carlyle A. Luer elevated it to the rank of species, calling it *Platanthera integrilabia*. For those who prefer to consider this plant a *Habenaria*, using the combination *H. integrilabia* could lead to confusion with another species, for which the name *Habenaria integrilabris* was published in 1909. The International Code of Botanical Nomenclature, the "law" governing the scientific names given to plants, forbids such confusing names. This is the rationale for the recently published name, *Habenaria correllii*. *Platanthera integrilabia* is rare throughout its range. It has sustained significant habitat loss due to draining and clearing of its habitat for conversion to agricultural land, and is considered vulnerable to commercial or other over-collecting.

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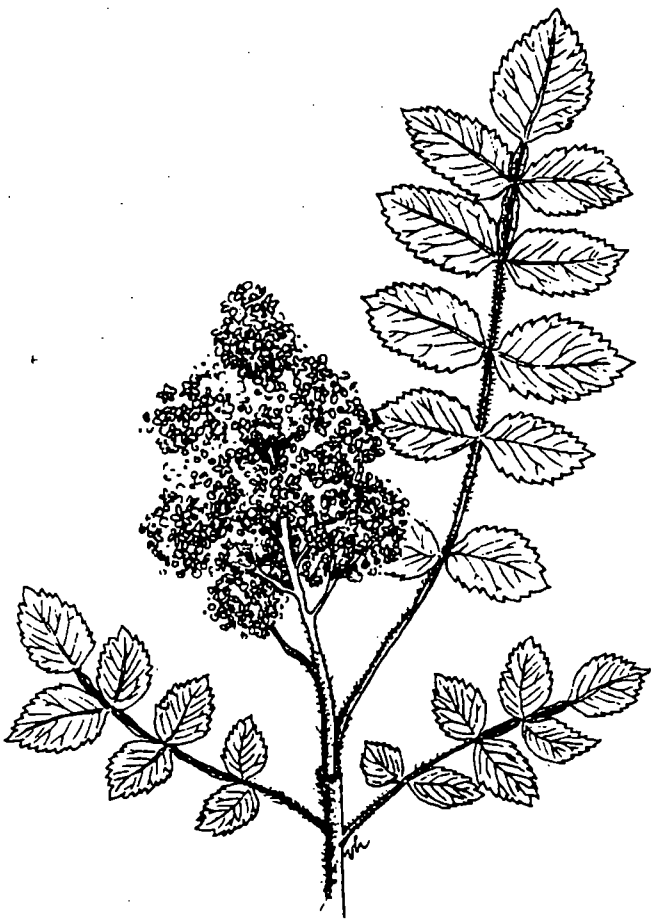
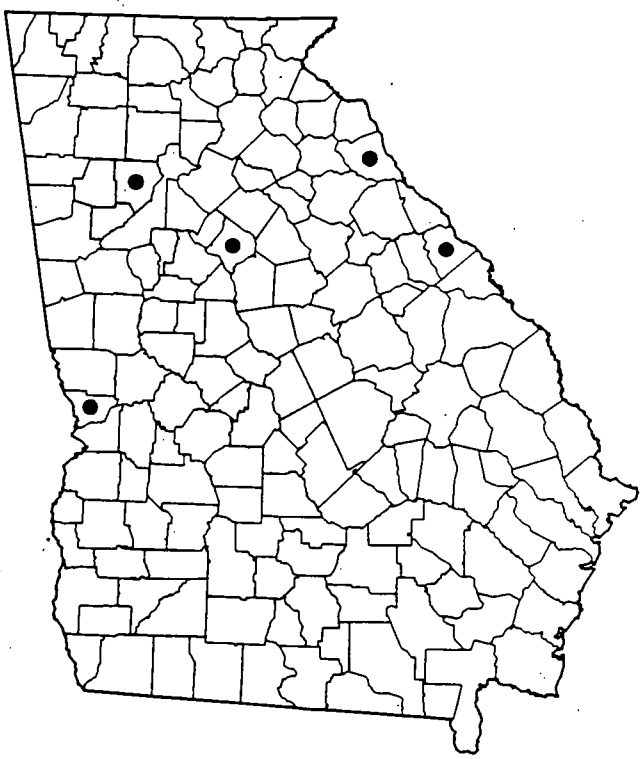
Rhus michauxii Sargent

Dwarf Sumac, False Poison Sumac, Michaux Sumac

Cashew Family, ANACARDIACEAE





LEGAL STATUS:
State: ENDANGERED
Federal: ENDANGERED

SYNONYMY: None in current usage.

RANGE: Inner Coastal Plain and Piedmont of Georgia, South Carolina (where possibly extirpated), North Carolina and adjacent Virginia (where first observed in 1993). Recorded from five counties in Georgia (see map).

ILLUSTRATION: Flowering branch, showing hairy leaves with uniform, coarse teeth, 0.6 × . Source: original drawing by Vicky Holifield.

DESCRIPTION: Shrub with a low stature, mostly 0.3–0.6 m tall, forming dense clumps when in healthy populations. Both the young twigs and the leaves are densely hairy. The leaves are divided into 7–13 leaflets on a hairy axis (rachis). Sometimes the axis may be narrowly winged toward the apex (see illustration). The leaflets are 4–9 cm long, 2–5 cm wide, oblong to oblong-lanceolate, without stalks (sessile), coarsely toothed, sharply pointed at the apex, and rounded at the base. Individuals are either male or female

(dioecious); the flowers are in dense, terminal panicles and have 4–5, tiny, greenish-yellow petals. The fruit is a drupe, deep red, densely hairy, and 5–6 mm in diameter. **Flowering period**: June to August; **fruiting period**: August to October. **Best search time**: during the growing season, since leaves are essential for identification.

HABITAT: Found on the Piedmont Plateau in rocky, open woods, especially in soils high in magnesium; perhaps also on sandhills of the Inner Coastal Plain.

SPECIAL IDENTIFICATION FEATURES: *Rhus michauxii* is readily distinguished by the combination of densely hairy twigs and leaves, coarsely and evenly toothed margins of the leaflets, and dwarf stature (under 1 m tall).

MANAGEMENT RECOMMENDATIONS: Prevent encroachment of trees and competing shrubs by controlled burning. Hand thinning of shading trees in its vicinity, if done carefully, may be beneficial to this species.

REMARKS: This species was first collected around 1789 by André Michaux (1746–1802), French botanist and explorer, and described in his *Flora Boreali-Americana,* published posthumously in 1802. Unfortunately the name he used had already been published for another species. In 1895 Sargent published the present name, commemorating the discoverer. Samuel Boykin made the first collection from Georgia in 1845, near Columbus. It has since been found at three or four other Georgia locations, but only a single locality in the state is known to harbor it today, and that site may support only a single clone. *Rhus michauxii* is rare throughout its range and has sustained significant habitat loss, at least in part due to fire suppression. Most of the remaining populations of this species are of only a single sex and at a considerable distance from other populations, and thus are able to reproduce only clonally. Like many other dioecious species (e.g., *Nestronia umbellula*) it has been seriously impacted by habitat fragmentation. *Rhus michauxii* sometimes hybridizes with smooth sumac (*R. glabra*) when both grow in the same general vicinity, forming *R.* × *ashei*.

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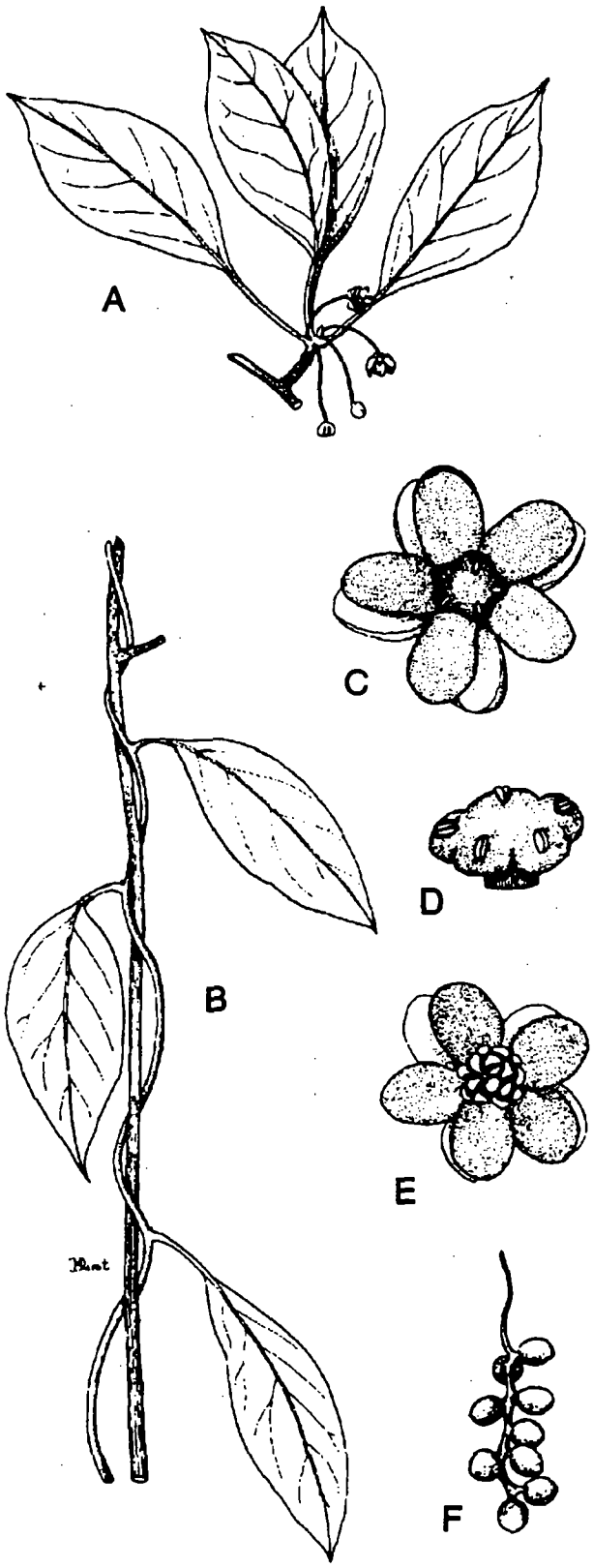
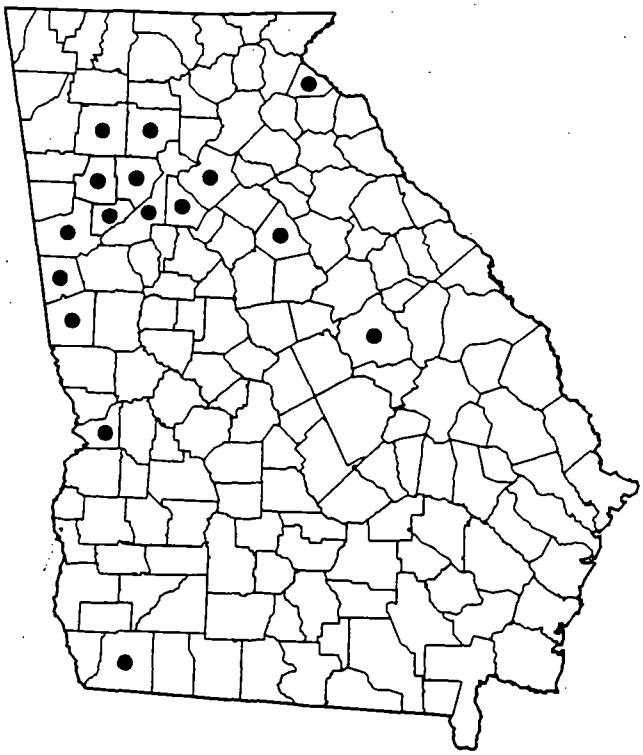
Schisandra glabra (Brickell) Rehder

Bay Star-vine, Climbing Magnolia, Wild Sarsaparilla

Star-vine Family, SCHISANDRACEAE





LEGAL STATUS:
State: THREATENED
Federal: None

SYNONYMY:
Schisandra coccinea Michaux

RANGE: Scattered in the Southeast: on the Coastal Plain from the Mississippi Embayment in Arkansas and Tennessee, south to Louisiana and east to northeastern North Carolina; on the Piedmont Plateau of Georgia; and disjunct on the Cumberland Plateau of southcentral Kentucky. Recorded from 16 counties in Georgia (see map).

ILLUSTRATION: (A) flowering shoot, 0.5×; (B) portion of vine, 0.5×; note twining stem without tendrils; (C) male flower, 4×; (D) stamens, fused into a pentagonal shield, 8×; (E) female flower, 4×; (F) cluster of fruits, as formed from a single flower, 0.8×. Source: Godfrey (1988), drawn by Melanie Darst and used with permission.

DESCRIPTION: Deciduous, woody vine. *Schisandra glabra* has stems to 3 cm thick, twining up to the crowns of trees or trailing along the ground. Sometimes large clumps of leaves form a ground

cover, resembling a sprawling Virginia creeper or woodbine (*Parthenocissus quinquefolia*). The leaves are up to 15 cm long and 6 cm wide, ovate to elliptic, with sparsely toothed margins, and are sweet-smelling when crushed. The leaves are alternate, but are close together on the slower growing secondary branchlets ("spur shoots"). Both male and female flowers occur on the same plant (monoecious), and droop on long, delicate flower stalks arising from the leaf axils of mature vines (see illustration). The 9–12 petals are 5–8 mm long, greenish outside and crimson-colored within. The fruit is an aggregate of red berries on an axis that elongates during ripening (see illustration). **Flowering period**: May to June; **fruiting period**: July to August. **Best search time**: from late spring to middle summer, since leaves tend to fall early.

HABITAT: Found twining over understory trees and shrubs in rich, forested bottomlands and adjacent lower slopes; sometimes older vines occur on trunks of overstory trees, or sprawl along the ground forming patches rooted in the litter, especially near mountain laurel (*Kalmia latifolia*) thickets.

SPECIAL IDENTIFICATION FEATURES: Bay star-vine can easily be confused with climbing hydrangea (*Decumaria barbara*), a quite common vine. The difference between the two is that *D. barbara* has opposite leaves and climbs by means of aerial roots, while *S. glabra* has alternate leaves and climbs only by twining. Both vines occupy similar habitats. The flowers of climbing hydrangea are showy, white, and in flat-topped clusters. In contrast, the flowers of bay star-vine are inconspicuous, maroon, and either solitary or in loose clusters.

MANAGEMENT RECOMMENDATIONS: Avoid disturbance. At most this species will tolerate only hand thinning of trees in its immediate vicinity, and only if done carefully. Control exotic weeds, especially Japanese honeysuckle.

REMARKS: John Brickell, a physician and amateur botanist, described this species in 1803, based upon collections from near Savannah, where he lived, and from Beaufort, South Carolina. Like croomia (*Croomia pauciflora*), twinleaf (*Jeffersonia diphylla*), and Oconee bells (*Shortia galacifolia*), the closest living relatives of this species are found in Asia. *Schisandra* and, for example, *Illicium*, *Isoetes*, and *Torreya* are described by many as "primitive" because they share some significant characteristics with fossil forms that are many millions of years old. Others dislike such terms as "primitive" (or "lower plants" for ferns, mosses, etc.), feeling that these labels have some negative connotations. After all, plants such as these have demonstrated a perfection of adaptation that has enabled them to survive through eons when many evolutionary innovations have been tried and found wanting! *Schisandra glabra* is rare throughout its range and has sustained significant habitat loss due to clearing of hardwood forest for conversion to agricultural land or pine plantation.

SELECTED REFERENCES:

Duncan, W. H. 1975. Woody Vines of the Southeastern United States. University of Georgia Press, Athens. 76 pp.

Ettman, D. 1980. A study of *Schisandra glabra* (Brickell) Rehder, a rare species endemic to the southeastern United States. Unpublished M.S. thesis, Emory University, Atlanta, Georgia. 134 pp.

Godfrey, R. K. 1988. Trees, Shrubs, and Woody Vines of Northern Florida and Adjacent Georgia and Alabama. University of Georgia Press, Athens. 734 pp.

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Radford, A. E., H. E. Ahles, and C. R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press, Chapel Hill. 1183 pp.

Stone, D. E. 1968. Cytological and morphological notes on the southeastern endemic *Schisandra glabra* (Schisandraceae). Journal of the Elisha Mitchell Scientific Society 84:351–356.

Taylor, D. D. 1994. *Schisandra glabra* (Schisandraceae) new to Kentucky. Sida 16:213–214.

Wood, C. E., Jr. 1958. The genera of the woody Ranales in the southeastern United States. Journal of the Arnold Arboretum 39:296–346.

Waldsteinia lobata (Baldwin) Torrey & Gray

Piedmont Barren Strawberry

Rose Family, ROSACEAE

LEGAL STATUS:
State: THREATENED
Federal: None

SYNONYMY: None in current usage.

RANGE: Mostly found on the Piedmont Plateau of Georgia and extreme northwestern South Carolina; extremely local and sporadic in adjacent Blue Ridge Mountains of northeastern Georgia, South Carolina and southwestern North Carolina. Recorded from 13 counties in Georgia (see map).

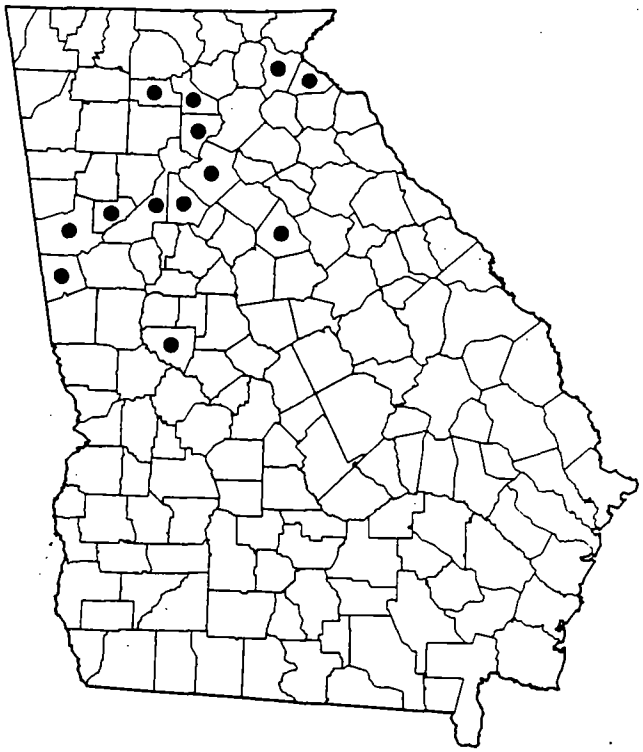
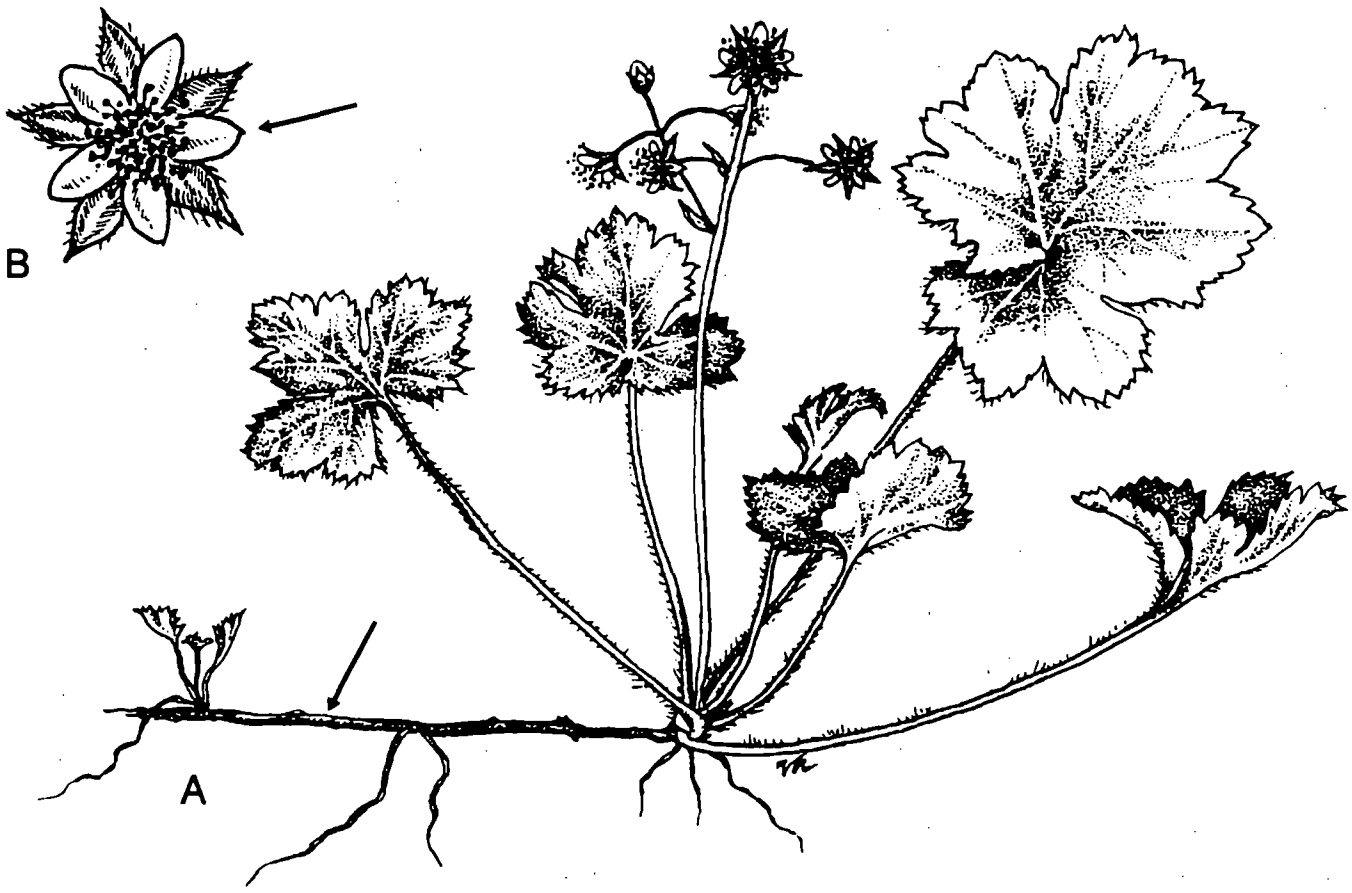


ILLUSTRATION: (A) plant habit, 1 ×; note runner (stolon); (B) flower, top view, 3 ×; note that the petals are shorter than the adjacent sepals. Source: original drawing by Vicky Holifield.

DESCRIPTION: Perennial herb. This is a low plant to 15 cm high that spreads by subsurface stolons or runners, forming clumps like a strawberry patch. The leaves are rounded with a cordate base, 3–5-lobed, irregularly toothed on the margins, hairy, 3.5–7.0 cm long, about as wide,



and attached to the stem by long, softly hairy leafstalks (petioles). The basal lobes sometimes overlap, especially on vigorous, newly formed leaves, producing an asymmetric shape (see illustration). The leaves are evergreen but turn burgundy red in fall and are replaced in spring by a fresh growth of new leaves. The flowers are in loose clusters atop long, softly hairy stalks that equal or exceed the leaves. The five bright yellow petals are 2.5–4.0 mm long, 1–2 mm wide, oblong to narrowly elliptic, and nearly as long as the sharply pointed, hairy sepals. The numerous (50 or more) stamens contribute most of the color to the flowers. The fruit is a cluster of 4–6 brown achenes. **Flowering period:** March to May; **fruiting period:** June to July. **Best search time:** all year, since leaf shape and habit are diagnostic.

HABITAT: Found in rocky, acidic woods along streams with mountain laurel (*Kalmia latifolia*); rarely in drier, upland oak-hickory-pine woods.

SPECIAL IDENTIFICATION FEATURES: The yellow flowers with petals slightly shorter than the sepals and the evergreen, lobed leaves are useful characters. The plants form dense clumps propagating by short runners. Both wild strawberry (*Fragaria virginiana*) and Indian or false strawberry (*Duchesnea indica*) have leaves divided into leaflets with strongly parallel secondary veins and uniform teeth on the margins. In contrast, Piedmont barren strawberry (*Waldsteinia lobata*) has lobed leaves with indistinct secondary veins and irregular teeth on the margins. Furthermore, the wild and false strawberries form a fleshy, red fruit, whereas the barren strawberry produces a "barren" fruit that is brown and dry.

MANAGEMENT RECOMMENDATIONS: Avoid disturbance. At most this species will tolerate only hand thinning of trees in its vicinity, and only if done carefully. Control exotic weeds, especially Japanese honeysuckle.

REMARKS: Carl Ludwig Willdenow named the genus *Waldsteinia* in honor of a German botanist, Count von Waldstein-Wartenburg. It contains about six species, two Old World species and four of North America. William Baldwin originally described this species as *Dalibarda lobata*, based on an 1812 collection from somewhere along the Flint River, in Georgia. John Torrey and Asa Gray published the present name in their *Flora of North America* (1838–1843). The piedmont barren strawberry has since been found at about 20 locations in Georgia and at a handful in adjacent South Carolina and North Carolina. Its presence in Carroll and Heard Counties in western Georgia suggests that it may also grow in the Piedmont of Alabama. *Waldsteinia lobata* is rare throughout its range. It has sustained significant habitat loss due to clearing of forest land for agriculture and conversion of hardwood forest to pine plantation.

SELECTED REFERENCES:

Douglas, C. C. 1980. *Waldsteinia lobata* (Baldwin) Torrey & Gray (Rosaceae) verified for South Carolina. Castanea 45(4):228–232.

Duncan, W. H. and L. E. Foote. 1975. Wildflowers of the Southeastern United States. University of Georgia Press, Athens. 296 pp.

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Rickett, H. W. 1966. Wild Flowers of the United States. Volume 2. The Southeastern States. McGraw-Hill, New York. 688 pp.

Small, J. K. 1933. Manual of the Southeastern Flora. 1972 Reprint Edition. Hafner Publishing Company, New York. 1554 pp.

REFERENCE 15

U.S. EPA REGION IV

SDMS

Unscannable Material Target Sheet

DocID: 10730238 Site ID: GADO05101344

Site Name: Young Refining Corp.

Nature of Material:

Map:	☑	Computer Disks:	☐
Photos:	☐	CD-ROM:	☐
Blueprints:	☐	Oversized Report:	☐
Slides:	☐	Log Book:	☐

Other (describe): Radius Map

Amount of material: _____

* Please contact the appropriate Records Center to view the material *

REFERENCE 16

U.S. EPA REGION IV

SDMS

Unscannable Material Target Sheet

DocID: 10730238 Site ID: GAD051013 44

Site Name: Young Refining Corp.

Nature of Material:

Map:	☑	Computer Disks:	☐
Photos:	☐	CD-ROM:	☐
Blueprints:	☐	Oversized Report:	☐
Slides:	☐	Log Book:	☐

Other (describe): National Wellands Inventory

Amount of material: _____

* Please contact the appropriate Records Center to view the material *

REFERENCE 20

CLIMATOLOGICAL DATA

GEORGIA

OCTOBER 1995

VOLUME 099 NUMBER 10

ISSN 0145-0492

TEMPERATURE AND PRECIPITATION EXTREMES

HIGHEST TEMPERATURE	93	OCTOBER 5	2 STATIONS
LOWEST TEMPERATURE	29	OCTOBER 23	CLARKSVILLE
GREATEST TOTAL PRECIPITATION	12.88		DAWSONVILLE
LEAST TOTAL PRECIPITATION	1.06		SAPELO ISLAND
GREATEST 1 DAY PRECIPITATION	6.68	OCTOBER 4	ATLANTA WSO AIRPORT R

"I certify that this is an official publication of the National Oceanic and Atmospheric Administration (NOAA). It is compiled using information from weather observing sites supervised by NOAA/National Weather Service and received at the National Climatic Data Center (NCDC), Asheville, North Carolina 28801."

Kenneth D Hadeen

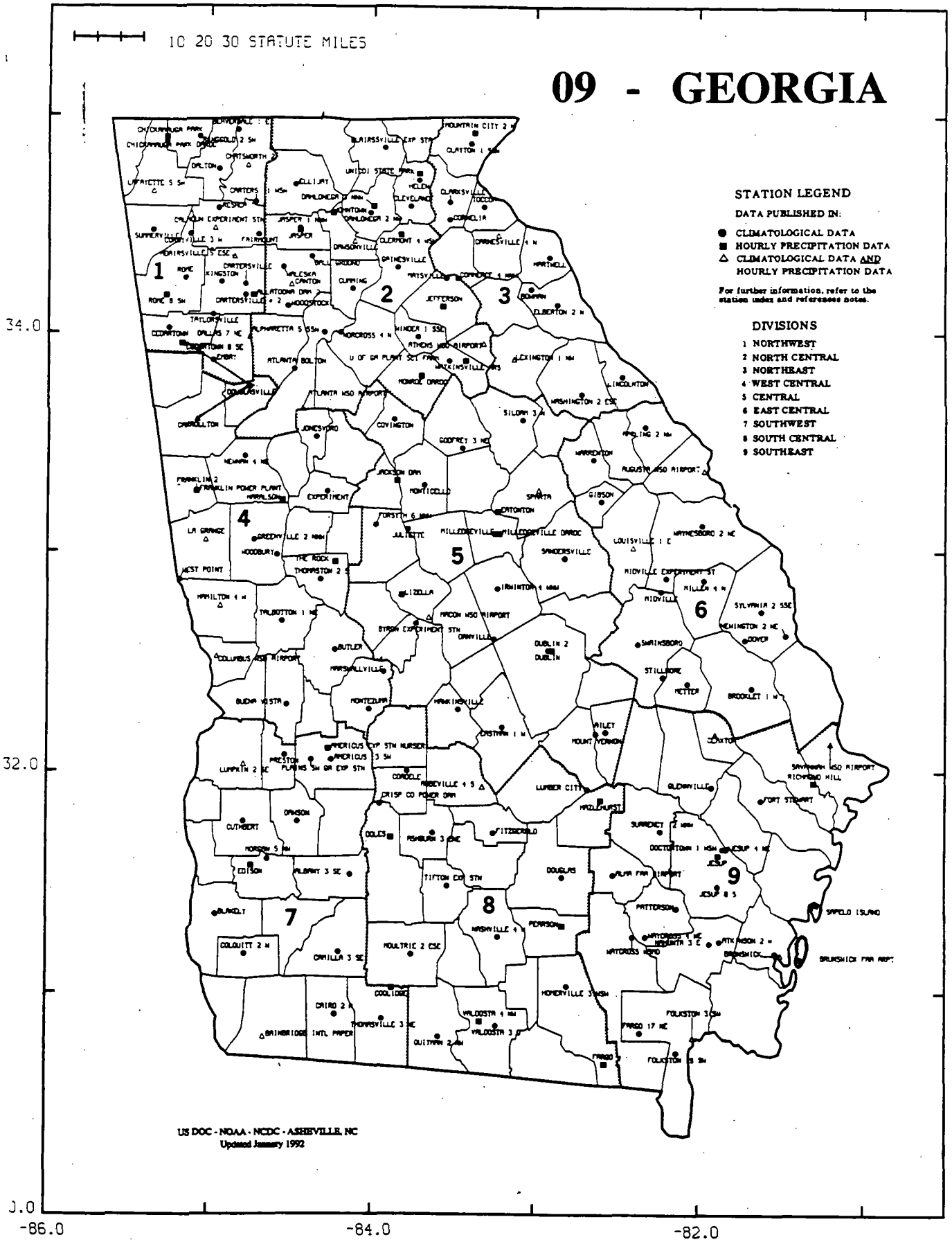
DIRECTOR
NATIONAL CLIMATIC DATA CENTER

noaa

National Oceanic and Atmospheric Administration

National Environmental Satellite, Data and Information Service

National Climatic Data Center Asheville, North Carolina



Douglasville - Carrolton 27.3 mi

Douglasville - Cedartown 35.5 mi

GEORGIA
OCTOBER 1995

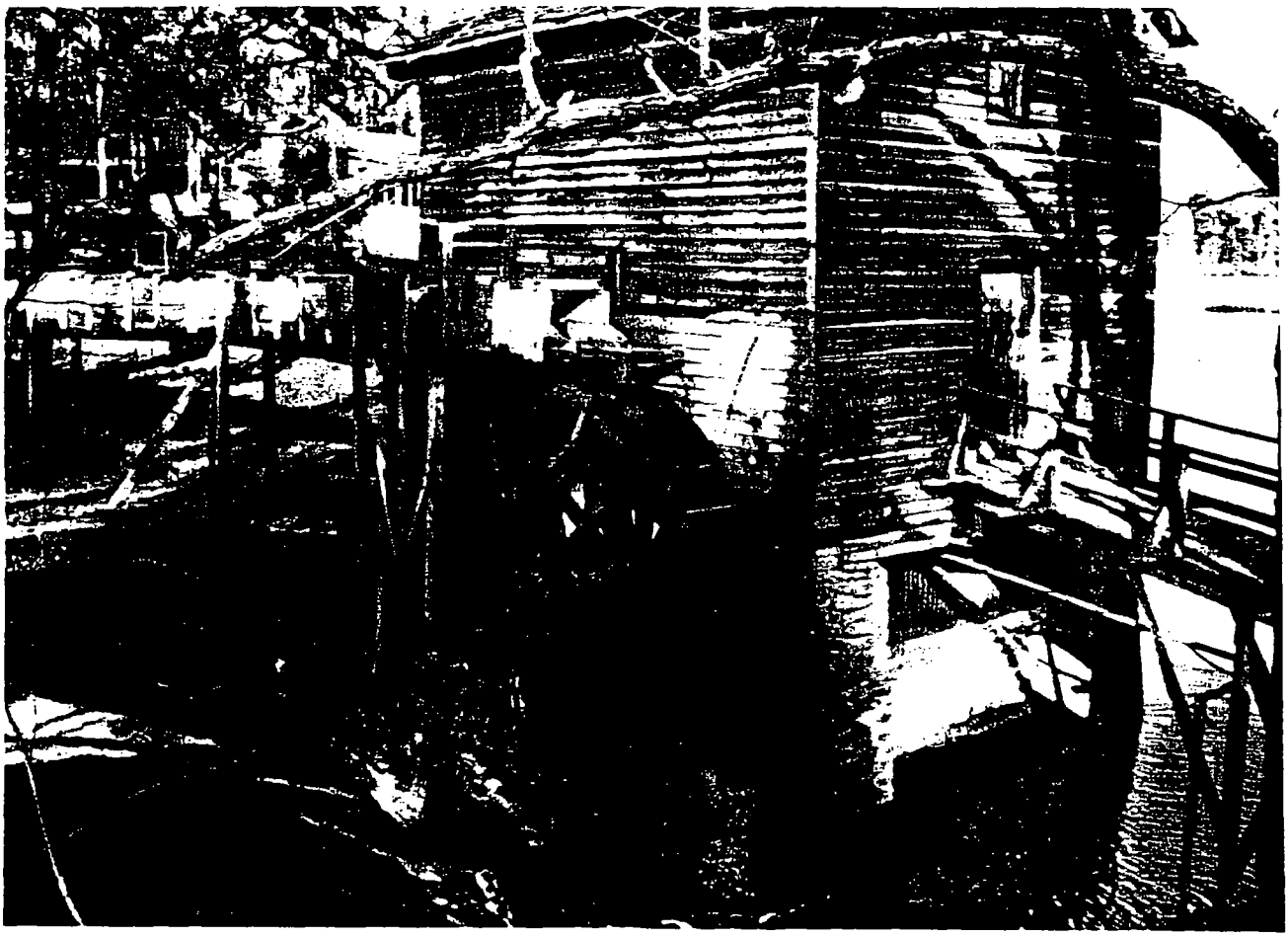
MONTHLY STATION AND DIVISION SUMMARY

STATION	PRECIPITATION (IN)									
					SLEET, SNOW			NO. OF DAYS		
	TOTAL	DEPARTURE FROM NORMAL	GREATEST DAY	DATE	TOTAL	MAX. DEPTH ON GROUND	DATE	.10 OR MORE	.50 OR MORE	1.00 OR MORE
GEORGIA										
NORTHWEST 01										
ALLATOONA DAM 2	10.80	7.64	3.44	4	.0	0		6	4	3
CALHOUN EXP STATION	9.60	6.34	4.06	5	.0	0		5	3	3
CARTERSVILLE	3.45	.81	1.50	4	.0	0		5	3	2
CEDARTOWN 3 NE	10.80	7.76	5.08	4	.0	0		5	3	2
DALLAS 7 NE	9.58	6.15	3.55	4	.0	0		6	4	3
DALTON	8.59	4.97	3.90	5	.0	0		5	3	3
LAFAYETTE 5 SW	8.32	4.79	4.41	5	.0	0		7	3	3
ROME	10.37	7.36	4.51	4	.0	0		6	3	3
--DIVISIONAL DATA-------->	8.94	5.74			.0					
NORTH CENTRAL 02										
ATHENS WSO AIRPORT	7.29	4.01	4.23	4	.0	0		6	4	1
ATLANTA WSO AIRPORT R	11.04	7.99	6.68	4	.0	0		6	5	3
BLAIRSVILLE EXP STA	8.89	5.14	3.56	5	.0	0		7	4	2
BLUE RIDGE 3 SW	9.08		4.10	5	.0	0		5	4	3
COMMERCE 4 NNW	10.44	6.52	6.32	4	.0	0		7	4	3
DAHLONEGA 2 NW	9.09	5.03	3.45	5	.0	0		6	4	3
GAINESVILLE	10.25	6.37	4.30	4	.0	0		5	4	2
HELEN	9.26	4.77	3.20	13	.0	0		7	4	4
JASPER 1 NNW	7.79	3.93	3.31	4	.0	0		8	3	3
U OF GA PLANT SCI FARM	7.28		3.20	4	.0	0		7	4	3
WINDER 1 SSE	10.09	6.28	4.35	5	.0	0		4	4	3
--DIVISIONAL DATA-------->	9.14	5.44			.0					
NORTHEAST 03										
CLARKSVILLE	9.48		3.94	4	.0	0		7	4	3
CLAYTON 1 SSW	10.37	5.24	3.90	4	.0	0		7	4	3
CORNELIA	10.73	6.67	3.97	4	.0	0		9	3	3
ELBERTON 2 N	7.18	3.97	1.85	5	.0	0		6	5	4
HARTWELL	8.06	4.61	2.80	5	.0	0		6	4	4
TOCCOA	9.25	5.18	3.42	5	.0	0		6	5	4
WASHINGTON 2 ESE	5.50	2.35	1.57	28	.0	0		8	3	3
--DIVISIONAL DATA-------->	8.65	4.81			.0					
WEST CENTRAL 04										
CARROLLTON	11.04	7.82	4.52	5	.0	0		7	3	3
COLUMBUS WSO AIRPORT R	8.41	6.19	4.13	4	.0	0		5	3	3
EXPERIMENT	7.92	4.87	3.15	4	.0	0		6	4	3
JONESBORO	9.88	6.67	4.50	4	.0	0		6	4	3
LA GRANGE	9.77	6.74	4.00	5	.0	0		5	3	3
MARSHALLVILLE	M 1.40		.90	5	.0	0		2	2	0
NEWNAN 4 NE	6.13	2.94	3.06	4	.0	0		5	4	2
PEACHTREE CITY	9.69		6.44	4	.0	0		5	3	3
TALBOTTON	7.23	4.52	3.01	28	.0	0		4	3	3
THOMASTON 2 S	3.81	1.26	1.68	5	.0	0		3	3	2
WEST POINT	10.04		4.00	5	.0	0		5	4	2
--DIVISIONAL DATA-------->	8.39	5.61			.0					
CENTRAL 05										
BYRON EXPERIMENT STN	4.27		2.14	28	.0	0		5	2	1
COVINGTON	6.98	3.80	2.30	4	.0	0		5	4	4
DUBLIN	4.31	1.93	2.10	28	.0	0		6	3	1
EASTMAN 1 W	2.62	.34	.72	29	.0	0		7	3	0
FORSYTH 6 NNW	7.17	4.57	2.25	30	.0	0		6	4	3
HAWKINSVILLE	2.30	.15	.68	5	.0	0		6	3	0
IRWINTON 4 WNW	2.15	-.32	1.32	15	.0	0		4	1	1
MACON WSO AIRPORT R	4.41	2.23	2.10	27	.0	0		7	3	1
MILLEDGEVILLE	5.14	2.60	2.88	28	.0	0		6	2	2
MONTICELLO	6.84	4.00	2.43	5	.0	0		6	3	3
SANDERSVILLE	4.83	2.48	1.88	28	.0	0		5	3	3
SILOAM 3 N	4.47	1.78	1.50	4	.0	0		5	4	2
--DIVISIONAL DATA-------->	4.62	2.14			.0					
EAST CENTRAL 06										
APPLING 2 NW	4.35	1.01	1.60	28	.0	0		5	4	2
AUGUSTA WSO AIRPORT R	4.23	1.39	1.82	27	.0	0		5	3	2
BROOKLET 1 W	1.32	-.99	.63	28	.0	0		3	1	0
LOUISVILLE 1 E	3.25	.51	1.85	28	.0	0		5	1	1
METTER					M	M				
MIDVILLE EXPERIMENT ST	2.94	.36	1.35	28	.0	0		5	2	1
MILLEN 4 N	2.55	-.10	1.33	28	.0	0		4	2	1
SWAINSBORO	2.55	.39	.90	28	.0	0		6	3	0
SYLVANIA 2 SSE	1.11		.88	28	.0	0		2	1	0

REFERENCE 21

WATER USE IN GEORGIA BY COUNTY FOR 1990

Julia L. Fanning, Glenn A. Doonan, and Lorinda T. Montgomery



GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
GEORGIA GEOLOGIC SURVEY

INFORMATION CIRCULAR 90

COBB COUNTY

Population: 447,745
Population served by public supply: 438,790
Acres irrigated: 1,383
Hydroelectric use (Mgal/d): 0

WITHDRAWALS IN MILLION GALLONS PER DAY							
	Public Supply	Domestic & Commercial	Industry & Mining	Irrigation	Livestock	Thermo-electric	TOTALS
Ground Water	0.19	0.68	0.00	0.43	0.01	0.00	1.31
Surface Water	74.96	0.00	1.23	2.27	0.04	319.76	398.26
TOTALS	75.15	0.68	1.23	2.70	0.05	319.76	399.57

Withdrawals by Major Public Suppliers (Mgal/d):

	GW	SW
Cobb County-Marietta Water Auth.	0.00	74.96
City of Powder Springs	0.13	0.00

Withdrawals by Major Industrial Groups (Mgal/d):

SIC	GW	SW
26 Paper	0.00	1.23

COFFEE COUNTY

Population: 29,592
Population served by public supply: 17,890
Acres irrigated: 5,843
Hydroelectric use (Mgal/d): 0

WITHDRAWALS IN MILLION GALLONS PER DAY							
	Public Supply	Domestic & Commercial	Industry & Mining	Irrigation	Livestock	Thermo-electric	TOTALS
Ground Water	4.20	0.96	0.00	0.69	0.04	0.00	5.89
Surface Water	0.00	0.00	0.00	1.81	0.67	0.00	2.48
TOTALS	4.20	0.96	0.00	2.50	0.71	0.00	8.37

Withdrawals by Major Public Suppliers (Mgal/d):

	GW	SW
City of Ambrose	0.04	0.00
City of Broxton	0.15	0.00
City of Douglas	3.77	0.00
City of Nicholls	0.13	0.00

Withdrawals by Major Industrial Groups (Mgal/d):

SIC	GW	SW
None		

DOUGHERTY COUNTY

Population: 96,311
Population served by public supply: 96,311
Acres irrigated: 15,905
Hydroelectric use (Mgal/d): 1,008

WITHDRAWALS IN MILLION GALLONS PER DAY

	Public Supply	Domestic & Commercial	Industry & Mining	Irrigation	Livestock	Thermo-electric	TOTALS
Ground Water	18.15	1.14	9.48	6.17	0.04	0.00	34.98
Surface Water	0.00	0.00	0.00	0.55	0.03	92.75	93.33
TOTALS	18.15	1.14	9.48	6.72	0.07	92.75	128.31

Withdrawals by Major Public Suppliers (Mgal/d):

	GW	SW
City of Albany	17.96	0.00
Putney Water System	0.02	0.00

Withdrawals by Major Industrial Groups (Mgal/d):

SIC	GW	SW
14 Mining	0.01	0.00
20 Food	1.42	0.00
26 Paper	3.83	0.00
28 Chemicals	4.03	0.00
30 Rubber	0.05	0.00
32 Stone, Clay	0.14	0.00

DOUGLAS COUNTY

Population: 71,120
Population served by public supply: 70,409
Acres irrigated: 3,100
Hydroelectric use (Mgal/d): 0

WITHDRAWALS IN MILLION GALLONS PER DAY

	Public Supply	Domestic & Commercial	Industry & Mining	Irrigation	Livestock	Thermo-electric	TOTALS
Ground Water	0.13	0.13	0.00	0.00	0.01	0.00	0.27
Surface Water	5.55	0.00	0.00	0.68	0.03	0.00	6.26
TOTALS	5.68	0.13	0.00	0.68	0.04	0.00	6.53

Withdrawals by Major Public Suppliers (Mgal/d):

	GW	SW
Douglasville - Douglas Co. W&S Authority	0.00	4.62

Withdrawals by Major Industrial Groups (Mgal/d):

SIC	GW	SW
None		

OGLETHORPE COUNTY

Population: 9,763
Population served by public supply: 1,722
Acres irrigated: 56
Hydroelectric use (Mgal/d): 0

WITHDRAWALS IN MILLION GALLONS PER DAY							
	Public Supply	Domestic & Commercial	Industry & Mining	Irrigation	Livestock	Thermo-electric	TOTALS
Ground Water	0.07	0.60	0.00	0.00	0.00	0.00	0.67
Surface Water	0.15	0.00	0.00	0.11	0.44	0.00	0.70
TOTALS	0.22	0.60	0.00	0.11	0.44	0.00	1.37

Withdrawals by Major Public Suppliers (Mgal/d):

	GW	SW
City of Arnoldsville	0.01	0.00
City of Crawford	0.00	0.14
City of Lexington	0.04	0.00
Town of Maxeys	0.02	0.00

Withdrawals by Major Industrial Groups (Mgal/d):

SIC	GW	SW
None		

PAULDING COUNTY

Population: 41,611
Population served by public supply: 39,530
Acres irrigated: 121
Hydroelectric use (Mgal/d): 0

WITHDRAWALS IN MILLION GALLONS PER DAY							
	Public Supply	Domestic & Commercial	Industry & Mining	Irrigation	Livestock	Thermo-electric	TOTALS
Ground Water	0.11	1.26	0.00	0.32	0.00	0.00	1.69
Surface Water	2.70	0.00	0.00	0.05	0.15	0.00	2.90
TOTALS	2.81	1.26	0.00	0.37	0.15	0.00	4.59

Withdrawals by Major Public Suppliers (Mgal/d):

	GW	SW
City of Dallas	0.00	0.30
City of Hiram	0.11	0.00

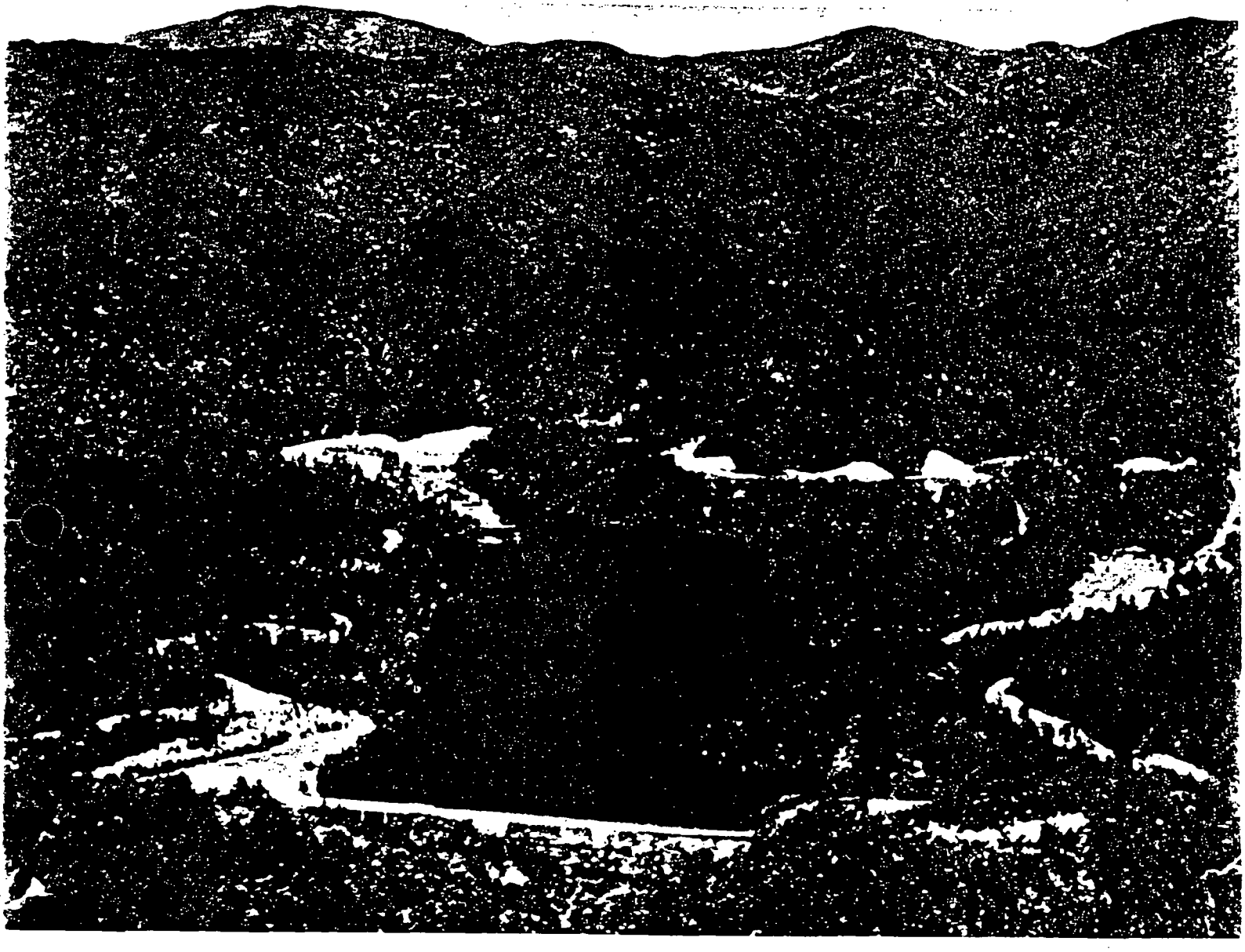
Withdrawals by Major Industrial Groups (Mgal/d):

SIC	GW	SW
None		

REFERENCE 22

STORAGE REQUIREMENTS FOR GEORGIA STREAMS

U.S. GEOLOGICAL SURVEY



WATER RESOURCES INVESTIGATIONS

Open-File Report 82-557

Prepared in cooperation with the
GEORGIA DEPARTMENT OF NATURAL RESOURCES

STORAGE REQUIREMENTS FOR GEORGIA STREAMS

By R. F. Carter

U.S. GEOLOGICAL SURVEY

Water Resources Investigations

Open-File Report 82-557

Prepared in cooperation with the

GEORGIA DEPARTMENT OF NATURAL RESOURCES

Doraville, Georgia

1983

Table 2.— Flow characteristics at selected sites on Georgia streams — Continued

(Type of station: D, daily-discharge gaging station; P, partial-record gaging station. Mean annual discharges: values in parentheses were estimated from plate 1. Low-flow index: minimum 7-day flow having a recurrence interval of 10 years)

Station number	Name	Location	Type	Drainage area (mi^2)	Mean annual discharge, adjusted to period 1941-70		Low-flow index		Region
					Cubic feet per second	Cubic feet per second per square mile	Cubic feet per second	Ratio to mean	
Apalachicola River Basin--Continued									
02333600	Yahoola Creek at Dahlonega	Lat 34°32'41", long 83°58'08", Lumpkin County, at State Highway 52, at Dahlonega.	P	31.3	(71.9)	(2.30)	18	0.25	B
02335700	Big Creek near Alpharetta	Lat 34°03'02", long 84°16'10", Fulton County, on left bank at downstream side of county highway bridge, 2.6 mi southeast of Alpharetta, and 9.4 mi upstream from mouth.	D	a72	101	1.39	14	.14	B
02335900	Rottenwoood Creek near Marietta	Lat 33°54'41", long 84°28'43", Cobb County, at Terrell Mill Road, near Marietta.	P	a15	(19.5)	(1.30)	3.6	.18	B
02336100	North Fork Peachtree Creek at Atlanta	Lat 33°50'28", long 84°18'46", DeKalb County, at Clairmont Road, near Atlanta.	P	27.8	(36.7)	(1.32)	.85	.023	B
02336300	Peachtree Creek at Atlanta	Lat 33°49'10", long 84°24'28", Fulton County, on downstream side of bridge on Northside Drive at Atlanta, 0.4 mi downstream from Tanyard Branch, and 4 mi upstream from mouth.	D	86.8	120	1.38	11	.092	B
02336400	Nancy Creek at Atlanta	Lat 33°50'54", long 84°25'58", Fulton County, at West Paces Ferry Road, at Atlanta.	P	38.2	(49.6)	(1.30)	3.7	.075	B
02336800	Sweetwater Creek near Hiram	Lat 33°48'17", long 84°47'10", Paulding County, at county road, 5.5 mi southwest of Hiram.	P	a50	(72.5)	(1.45)	1.5	.021	B
02337000	Sweetwater Creek near Austell	Lat 33°46'22", long 84°36'53", Douglas County, on right bank 100 ft upstream from bridge on Interstate Highway 20, 400 ft upstream from Blair Bridge, 3 mi southeast of Austell, and 5.5 mi upstream from mouth.	D	246	310	1.26	15	.048	B
02337200	Anneewakee Creek near Campbellton	Lat 33°39'55", long 84°41'02", Douglas County, at State Highway 166, 1 mi upstream from mouth.	P	a29	37.7	1.30	3.6	.095	B
02337400	Dog River near Douglasville	Lat 33°39'36", long 84°51'41", Douglas County, at county road, 2.2 mi north of Fair Play.	P	a43	(62.4)	(1.45)	5.8	.093	B
02337500	Snake Creek near Whitesburg	Lat 33°31'46", long 84°55'42", Carroll County, at downstream end of left bank pier of highway bridge at Banning Mills, 1.5 mi north of State Highway 16, 3 mi northwest of Whitesburg, 4 mi downstream from Little Snake Creek, and 7 mi upstream from mouth.	D	a37	55.8	1.51	9.2	.16	B
02338100	Wahoo Creek near Sargent	Lat 33°25'20", long 84°50'27", Coweta County, at county road, 2 mi southeast of Sargent.	P	a16	(20.2)	(1.26)	2.3	.11	B
02338400	Centralhatchee Creek near Franklin	Lat 33°18'58", long 85°06'19", Heard County, at U.S. Highway 27, north of Franklin.	P	a57	(87.8)	(1.54)	13	.15	B

a Approximately.

SITE INSPECTION WORKSHEETS

CERCLIS IDENTIFICATION NUMBER
GAD 051011344

SITE LOCATION			
SITE NAME: LEGAL, COMMON, OR DESCRIPTIVE NAME OF SITE Young Refining Corp.			
STREET ADDRESS, ROUTE, OR SPECIFIC LOCATION IDENTIFIER 7982 Huey Road			
CITY Douglasville	STATE GA	ZIP CODE 30134	TELEPHONE (770) 942-2343
COORDINATES: LATITUDE and LONGITUDE 33°45'47.25" N by 84°43'52.27" W	TOWNSHIP, RANGE, AND SECTION		

OWNER/OPERATOR IDENTIFICATION					
OWNER Young Refining Corp.			OPERATOR same		
OWNER ADDRESS PO Box 796			OPERATOR ADDRESS same		
CITY Douglasville			CITY same		
STATE GA	ZIP CODE 30133	TELEPHONE (770) 942-2343	STATE same	ZIP CODE same	TELEPHONE ( ) same

SITE EVALUATION		
AGENCY/ORGANIZATION GAEPD		
INVESTIGATOR Jim McNamara		
CONTACT		
ADDRESS 205 Butler St. Suite 1154		
CITY Atlanta	STATE GA	ZIP CODE 30334
TELEPHONE (404) 656-7802		

GENERAL INFORMATION

Site Description and Operational History: Provide a brief description of the site and its operational history. State the site name, owner, operator, type of facility and operations, size of property, active or inactive status, and years of waste generation. Summarize waste treatment, storage, or disposal activities that have or may have occurred at the site; note whether these activities are documented or alleged. Identify all source types and prior spills, floods, or fires. Summarize highlights of the PA and other investigations. Cite references. (3, 8, 9, 10)

Young Refining is located at 7982 Huey Road, approximately one mile northeast of downtown Douglasville in a mixed use (industrial/residential) area. The facility is bounded to the south by railroad tracks running parallel to U.S.78, on the west by Central Oil Asphalt, the closed Arivec Chemical facility (a former solvent recycler and fuels blender) and Huey Road, on the northwest by residences, and by cattle land along the north and east property boundaries.

The Young Refining site covers approximately 22 acres, about a third of which is occupied by the tanks and process equipment that comprise the refinery operation. The primary physical feature at Young Refining is the four pond cascade previously used to manage all process wastewater and storm water at the site. Pond number one is the southern-most pond, and is the highest topographically, being about twenty feet above the remaining three ponds. Wastewater and storm water would enter pond one through an API separator, fall twenty feet to pond number two, and then flow through ponds three and four before discharging to Cracker Creek, the designated receiving water for Young Refining's NPDES discharge. The highest ground at the site is along the railroad tracks and loading area to the south. The process areas are about five to ten feet lower in elevation, then the site drops another ten feet to pond number one, with the lowest point on the site more or less corresponding to the NPDES outfall point at the northwest corner of pond number four. The northeastern portion of the site is covered with trees and vegetation and is not used for site operations.

Young Refining is a primary refiner of asphaltic crude oil (API Gravity 16-17). Young Refining's primary product is roofing asphalt; they also produce varying amounts of paving asphalt, hydraulic oil base stocks, lubricating oils, heavy #5 oil, naphtha, and some #2 diesel fuel. In the past, Young had produced JP-4 jet fuel and re-refined used oil for use in the onsite boilers; facility representatives have indicated that they no longer do so.

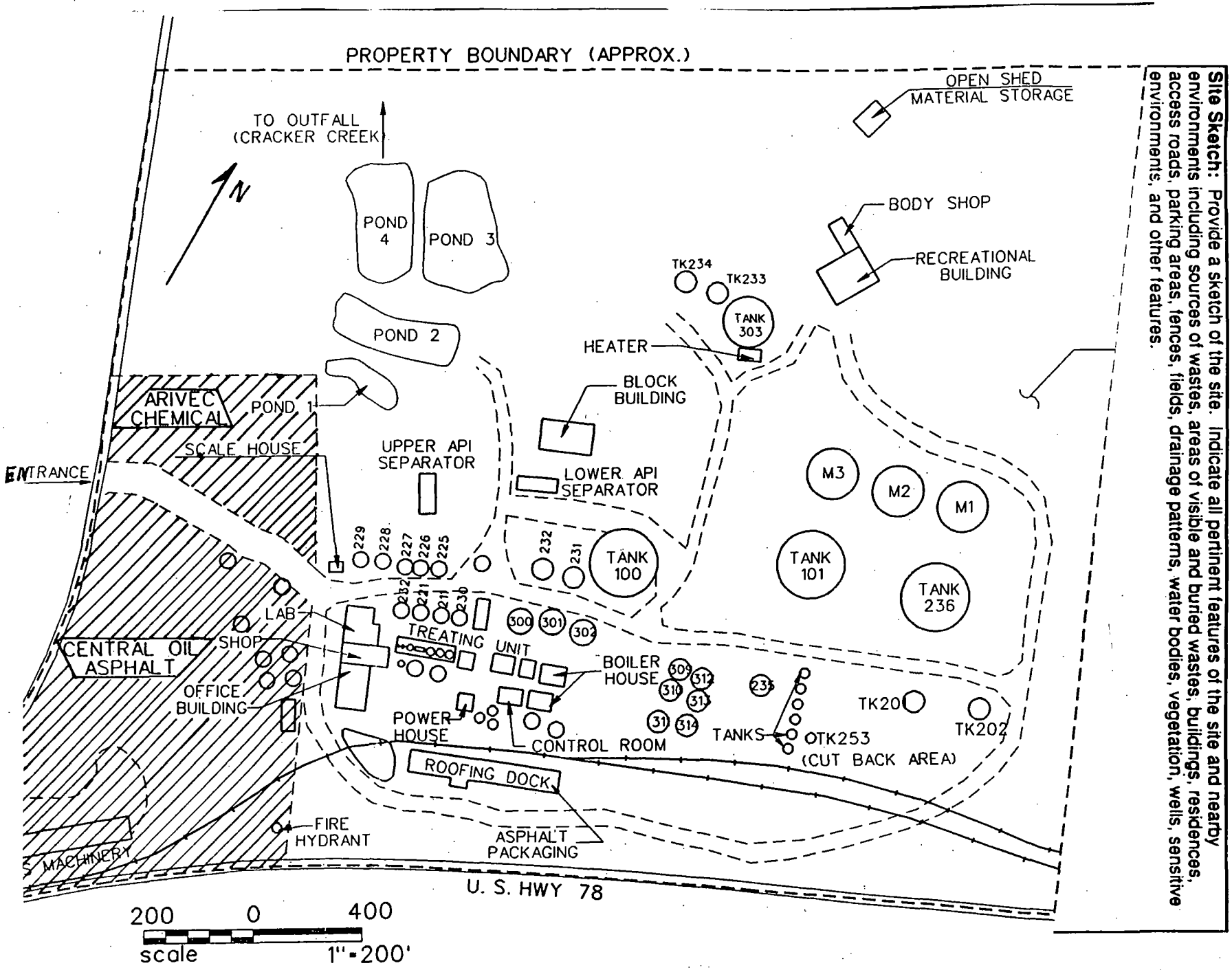
The facility was established in 1955 as Cracker Asphalt and was purchased in 1971 by Charles Young Ph.D., who renamed it Young Refining. Between 1976 and 1991, the facility was the subject of enforcement actions regarding industrial waste, hazardous waste, air and a citation from the state fire marshal.

On July 29, 1991, the Hazardous Waste branch of EPD took samples from the banks of pond number one and water samples from ponds number one, two and four. Results showed Young Refining was managing and treating hazardous waste in the ponds. In early-1993, violations of the Air Protection, Water Protection and Solid Waste rules of EPD were identified during a multi-media inspection. After protracted negotiations and issuance of an administrative order, consent order EPD-HW-1096 was signed on July 8, 1994. The order required immediate compliance with the facility's air permit (2911-048-10645) and NPDES permit (GA0001902) and removal of some accumulations of solid waste at the site. The order also provided for closure of the ponds as a hazardous waste management unit, groundwater evaluation and corrective action, RCRA permitting, payment of a penalty and supplemental environmental projects. On April 24, 1995, Young Refining was issued Administrative Order EPD-HW-1163, which required them to cease discharge of oily process wastewaters that result in the generation of F037/F038 to the ponds. Young Refining now manages and treats their process wastewater in tanks and discharges directly to the NPDES outfall through a six-inch PVC pipe.

On September 30, 1993, EPD finalized a RCRA Facility Assessment (RFA) that identified 12 Solid Waste Management Units (SWMUs) at the facility. However, most of these SWMUs are impacted by petroleum releases, which are excluded from CERCLA by the definitions of "hazardous substance" [§101(14)] and "pollutant or contaminant" [§101(33)] unless the "petroleum, including crude oil or any fraction thereof...is...otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of this paragraph (14)"; F037 and F038 are both so designated. Consequently, for the purposes of this site investigation, only the ponds and releases from them will be evaluated.

GENERAL INFORMATION (continued)

Site Sketch: Provide a sketch of the site. Indicate all pertinent features of the site and nearby environments including sources of wastes, areas of visible and buried wastes, buildings, residences, access roads, parking areas, fences, fields, drainage patterns, water bodies, vegetation, wells, sensitive environments, and other features.



GENERAL INFORMATION (continued)

Source Descriptions: Describe all sources at the site. Identify source type and relate to waste disposal operations. Provide source dimensions and the best available waste quantity information. Describe the condition of sources and all containment structures. Cite references.

SOURCE TYPES

Landfill: A man-made (by excavation or construction) or natural hole in the ground into which wastes have come to be disposed by backfilling, or by contemporaneous soil deposition with waste disposal.

Surface Impoundment: A natural topographic depression, man-made excavation, or diked area, primarily formed from earthen materials (lined or unlined) and designed to hold an accumulation of liquid wastes, wastes containing free liquids, or sludges not backfilled or otherwise covered; depression may be wet with exposed liquid or dry if deposited liquid has evaporated, volatilized or leached; structures that may be described as lagoon, pond, aeration pit, settling pond, tailings pond, sludge pit; also a surface impoundment that has been covered with soil after the final deposition of waste materials (i.e., buried or backfilled).

Drum: A portable container designed to hold a standard 55-gallon volume of wastes.

Tank and Non-Drum Container: Any device, other than a drum, designed to contain an accumulation of waste that provides structural support and is constructed primarily of fabricated materials (such as wood, concrete, steel, or plastic); any portable or mobile device in which waste is stored or otherwise handled.

Contaminated Soil: An area or volume of soil onto which hazardous substances have been spilled, spread, disposed, or deposited.

Pile: Any non-containerized accumulation above the ground surface of solid, non-flowing wastes; includes open dumps. Some types of waste piles are:

- Chemical Waste Pile: A pile consisting primarily of discarded chemical products, by-products, radioactive wastes, or used or unused feedstocks.
- Scrap Metal or Junk Pile: A pile consisting primarily of scrap metal or discarded durable goods (such as appliances, automobiles, auto parts, batteries, etc.) composed of materials containing hazardous substances.
- Tailings Pile: A pile consisting primarily of any combination of overburden from a mining operation and tailings from a mineral mining, beneficiation, or processing operation.
- Trash Pile: A pile consisting primarily of paper, garbage, or discarded non-durable goods containing hazardous substances.

Land Treatment: Landfarming or other method of waste management in which liquid wastes or sludges are spread over land and tilled, or liquids are injected at shallow depths into soils.

Other: Sources not in categories listed above.

GENERAL INFORMATION (continued)

Source Description: Include description of containment per pathway for ground water (see HRS Table 3-2), surface water (see HRS Table 4-2), and air (see HRS Tables 6-3 and 6-9).

The site has one source; four contiguous surface impoundments managing F037/F038. The source is defined as a single RCRA unit and is delineated by a 100' buffer around the impoundments. They are not lined.

Containment; groundwater - 10

surface water - 10

air - 10 (gas), 10 (particulate)

Hazardous Waste Quantity (HWQ) Calculation: SI Tables 1 and 2 (See HRS Tables 2-5, 2-6, and 5-2).

For closure purposes, the maximum extent of the hazardous waste management unit is the four ponds plus a one hundred (100) foot border outlining the ponds, and the associated drainage ditches. The API separators are within the 100 foot border and are part of the hazardous waste management unit. The estimated maximum inventory (both water and sludge) for the ponds is:

Pond	Maximum Inventory
1	20,300 cubic feet = 151,844 gallons
2	63,000 cubic feet = 471,240 gallons
3	144,000 cubic feet = 1,077,120 gallons
4	100,000 cubic feet = 748,000 gallons
Total	327,300 cubic feet = 2,448,204 gallons

Attach additional pages, if necessary Ref. 5 HWQ = 100

SI TABLE 1: HAZARDOUS WASTE QUANTITY (HWQ) SCORES FOR SINGLE SOURCE SITES AND FORMULAS FOR MULTIPLE SOURCE SITES

		Single Source Sites (assigned HWQ scores)	
(Column 1) TIER	(Column 2) Source Type	(Column 3) HWQ = 10	(Column 4) HWQ = 100
A Hazardous Constituent Quantity	N/A	HWQ = 1 if Hazardous Constituent Quantity data are complete HWQ = 10 if Hazardous Constituent Quantity data are not complete	>100 to 10,000 lbs
B Hazardous Wastestream Quantity	N/A	≤ 500,000 lbs	>500,000 to 50 million lbs
C Volume	Landfill	≤ 6.75 million ft^3 ≤ 250,000 yd^3	>6.75 million to 675 million ft^3 >250,000 to 25 million yd^3
	Surface impoundment	≤6,750 ft^3 ≤250 yd^3	>6,750 to 675,000 ft^3 >250 to 25,000 yd^3
	Drums	≤1,000 drums	>1,000 to 100,000 drums
	Tanks and non-drum containers	≤50,000 gallons	>50,000 to 5 million gallons
	Contaminated soil	≤6.75 million ft^3 ≤250,000 yd^3	>6.75 million to 675 million ft^3 >250,000 to 25 million yd^3
	Pile	≤6,750 ft^3 ≤250 yd^3	>6,750 to 675,000 ft^3 >250 to 25,000 yd^3
	Other	≤6,750 ft^3 ≤250 yd^3	>6,750 to 675,000 ft^3 >250 to 25,000 yd^3
D Area	Landfill	≤340,000 ft^2 ≤7.8 acres	>340,000 to 34 million ft^2 >7.8 to 780 acres
	Surface impoundment	≤1,300 ft^2 ≤0.029 acres	>1,300 to 130,000 ft^2 >0.029 to 2.9 acres
	Contaminated soil	≤3.4 million ft^2 ≤78 acres	> 3.4 million to 340 million ft^2 > 78 to 7,800 acres
	Pile	≤1,300 ft^2 ≤0.029 acres	>1,300 to 130,000 ft^2 >0.029 to 2.9 acres
	Land treatment	≤27,000 ft^2 ≤0.62 acres	>27,000 to 2.7 million ft^2 >0.62 to 62 acres

TABLE 1 (CONTINUED)

Single Source Sites (assigned HWQ scores)		Multiple Source Sites		
(Column 5) HWQ = 10,000	(Column 6) HWQ = 1,000,000	(Column 7) Divisors for Assigning Source WQ Values	(Column 2) Source Type	(Column 1) TIER
>10,000 to 1 million lbs	> 1 million lbs	lbs ÷ 1	N/A	A Hazardous Constituent Quantity
>50 million to 5 billion lbs	> 5 billion lbs	lbs ÷ 5,000	N/A	B Hazardous Wastestream Quantity
>675 million to 67.5 billion ft^3 >25 million to 2.5 billion yd^3	> 67.5 billion ft^3 > 2.5 billion yd^3	ft^3 ÷ 67,500 yd^3 ÷ 2,500	Landfill	C Volume
>675,000 to 67.5 million ft^3 >25,000 to 2.5 million yd^3	> 67.5 million ft^3 > 2.5 million yd^3	ft^3 ÷ 67.5 yd^3 ÷ 2.5	Surface Impoundment	
>100,000 to 10 million drums	> 10 million drums	drums ÷ 10	Drums	
>5 million to 500 million gallons	> 500 million gallons	gallons ÷ 500	Tanks and non-drum containers	
>675 million to 67.5 billion ft^3 >25 million to 2.5 billion yd^3	> 67.5 billion ft^3 > 2.5 billion yd^3	ft^3 ÷ 67,500 yd^3 ÷ 2,500	Contaminated Soil	
>675,000 to 67.5 million ft^3 >25,000 to 2.5 million yd^3	> 67.5 million ft^3 > 2.5 million yd^3	ft^3 ÷ 67.5 yd^3 ÷ 2.5	Pile	
>675,000 to 67.5 million ft^3 >25,000 to 2.5 million yd^3	> 67.5 million ft^3 > 2.5 million yd^3	ft^3 ÷ 67.5 yd^3 ÷ 2.5	Other	
>34 million to 3.4 billion ft^2 >780 to 78,000 acres	> 3.4 billion ft^2 >78,000 acres	ft^2 ÷ 3,400 acres ÷ 0.078	Landfill	D Area
>130,000 to 13 million ft^2 >2.9 to 290 acres	> 13 million ft^2 > 290 acres	ft^2 ÷ 13 acres ÷ 0.00029	Surface Impoundment	
> 340 million to 34 billion ft^2 > 7,800 to 780,000 acres	> 34 billion ft^2 > 780,000 acres	ft^2 ÷ 34,000 acres ÷ 0.78	Contaminated Soil	
> 130,000 to 13 million ft^2 > 2.9 to 290 acres	> 13 million ft^2 > 290 acres	ft^2 ÷ 13 acres ÷ 0.00029	Pile	
>2.7 million to 270 million ft^2 >62 to 6,200 acres	> 270 million ft^2 > 6,200 acres	ft^2 ÷ 270 acres ÷ 0.0062	Land Treatment	

HAZARDOUS WASTE QUANTITY (HWQ) CALCULATION

For each migration pathway, evaluate HWQ associated with sources that are available (i.e., incompletely contained) to migrate to that pathway. (Note: If *Actual Contamination Targets* exist for ground water, surface water, or air migration pathways, assign the calculated HWQ score or 100, whichever is greater, as the HWQ score for that pathway.) For each source, evaluate HWQ for one or more of the four tiers (SI Table 1; HRS Table 2-5) for which data exist: constituent quantity, wastestream quantity, source volume, and source area. Select the tier that gives the highest value as the source HWQ. Select the source volume HWQ rather than source area HWQ if data for both tiers are available.

Column 1 of SI Table 1 indicates the quantity tier. Column 2 lists source types for the four tiers. Columns 3, 4, 5, and 6 provide ranges of waste amount for sites with only one source, corresponding to HWQ scores at the tops of the columns. Column 7 provides formulas to obtain source waste quantity values at sites with multiple sources.

1. Identify each source type.
2. Examine all waste quantity data available for each source. Record constituent quantity and waste stream mass or volume. Record dimensions of each source.
3. Convert source measurements to appropriate units for each tier to be evaluated.
4. For each source, use the formulas in the last column of SI Table 1 to determine the waste quantity value for each tier that can be evaluated. Use the waste quantity value obtained from the highest tier as the quantity value for the source.
5. Sum the values assigned to each source to determine the total site waste quantity.
6. Assign HWQ score from SI Table 2 (HRS Table 2-6).

Note these exceptions to evaluate soil exposure pathway HWQ (see HRS Table 5-2):

- The divisor for the area (square feet) of a landfill is 34,000.
- The divisor for the area (square feet) of a pile is 34.
- Wet surface impoundments and tanks and non-drum containers are the only sources for which volume measurements are evaluated for the soil exposure pathway.

SI TABLE 2: HWQ SCORES FOR SITES

Site WQ Total	HWQ Score
0	0
1[a] to 100	1[b]
> 100 to 10,000	100
> 10,000 to 1 million	10,000
> 1 million	1,000,000

[a] If the WQ total is between 0 and 1, round it to 1.
[b] If the hazardous constituent quantity data are not complete, assign the score of 10.

All these constituents have been detected in groundwater

SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET

Site Name: Young Refining Corp.

References 3, 6, 7

Sources:

1. HWMU - Surface Imp. / "Ponds"
2.
3.
4.
5.
6.
7.
8.
9.

SOURCE	HAZARDOUS SUBSTANCE	TOXICITY	GROUND WATER PATHWAY		SURFACE WATER PATHWAY											
					OVERLAND/FLOOD MIGRATION							GROUND WATER TO SURFACE WATER				
			GW Mobility (HRS Table 3-8)	Tox/ Mobility Value (HRS Table 3-9)	Per (HRS Tables 4-10 and 4-11)	Tox/Per Value (HRS Table 4-12)	Bioac Pot. (HRS Table 4-15)	Tox/ Pers/ Bioac Value (HRS Table 4-16)	Ecotox (HRS Table 4-19)	Ecotox/ Pers (HRS Table 4-20)	Ecotox/ Pers/ Bioacc Value (HRS Table 4-21)	Tox/ Mob/ Pers Value (HRS Table 4-26)	Tox/ Mob/ Pers/ Bioacc Value (HRS Table 4-28)	Ecotox/ Mob/ Pers Value (HRS Table 4-29)	Ecotox/ Mob/ Per/ Bioacc Value (HRS Table 4-30)	
	benzene	100	1	100	0.4	40	5000	5×10^5	100	40	2×10^4	40	2×10^4	40	500	S
	MEK	10	1	10	0.4	4	0.5	2	1	0.4	0.2	0.4	0.1	0.04	0.02	
	1,1 DCA	10	1	10	0.4	4	5	20				4	20			
	1,2 DCA	100	1	100	0.4	40	5	200	1	0.4	2	40	200	0.4	2	
	1,1 DCE	100	1	100	0.4	40	50	2000	10	4	200	40	2000	4	200	
	cis 1,2 DCE	100	1	100	0.4	40	5	200				40	200			
	trans 1,2 DCE	100	1	100	0.4	40	50	2000	1	0.4	20	40	2000	0.4	20	
	PCE	100	1	100	0.4	40	50	2000	100	40	2000	40	2000	40	2000	
	TCE	10	1	10	0.4	4	50	200	100	40	2000	4	200	40	2000	
⇒	VC	10,000	1	10,000	0.0007	7	5	35				7	35			
	Cr	10,000	0.01	100	1	10,000	5	5×10^4	100	100	500	100	500	1	5	S
	Pb	10,000	2×10^{-5}	0.2	1	10,000	50	5×10^5	1000	1000	5×10^6	0.2	10	0.02	100	S
	B(2eh)Phth	100	2×10^{-7}	2×10^{-5}	1	100	50,000	5×10^6	1000	1000	5×10^7	2×10^{-5}	1	2×10^{-4}	10	
	2,4 DMPh	100	1	100	1	100	500	5×10^4	100	100	5×10^4	100	5×10^4	100	5×10^4	

"S" indicates constituents identified in the source

continued

Ground Water Observed Release Substances Summary Table

On SI Table 4, list the hazardous substances associated with the site detected in ground water samples for that aquifer. Include only those substances directly observed or with concentrations significantly greater than background levels. Obtain toxicity values from the Superfund Chemical Data Matrix (SCDM). Assign mobility a value of 1 for all observed release substances regardless of the aquifer being evaluated. For each substance, multiply the toxicity by the mobility to obtain the toxicity/mobility factor value; enter the highest toxicity/mobility value for the aquifer in the space provided.

Ground Water Actual Contamination Targets Summary Table

If there is an observed release at a drinking water well, enter each hazardous substance meeting the requirements for an observed release by well and sample ID on SI Table 5 and record the detected concentration. Obtain benchmark, cancer risk, and reference dose concentrations from SCDM. For MCL and MCLG benchmarks, determine the highest percentage of benchmark obtained for any substance. For cancer risk and reference dose, sum the percentages for the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage or the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate the population using the well as a Level I target. If these percentages are less than 100% or all are N/A, evaluate the population using the well as a Level II target for that aquifer.

SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET

Site Name: Young Refining Corp. References 3,6,7

Sources:

1. HWMU - Surface Imp./"Ponds"
2.
3.
4.
5.
6.
7.
8.
9.

SOURCE	HAZARDOUS SUBSTANCE	TOXICITY	GROUND WATER PATHWAY		SURFACE WATER PATHWAY											
					OVERLAND/FLOOD MIGRATION							GROUND WATER TO SURFACE WATER				
			GW Mobility (HRS Table 3-8)	Tox/ Mobility Value (HRS Table 3-9)	Per (HRS Tables 4-10 and 4-11)	Tox/Per Value (HRS Table 4-12)	Bioac Pot. (HRS Table 4-15)	Tox/ Pers/ Bioac Value (HRS Table 4-16)	Ecotox (HRS Table 4-19)	Ecotox/ Pers (HRS Table 4-20)	Ecotox/ Pers/ Bioacc Value (HRS Table 4-21)	Tox/ Mob/ Pers Value (HRS Table 4-26)	Tox/ Mob/ Pers/ Bioacc Value (HRS Table 4-28)	Ecotox/ Mob/ Pers Value (HRS Table 4-29)	Ecotox/ Mob/ Per/ Bioacc Value (HRS Table 4-30)	
	acetone	10	1	10	0.4	4	0.5	2	100	40	20	4	2	40	20	
	chlorobenz.	100	1	100	0.0007	0.07	50	3.5	1000	0.7	35	0.07	3.5	0.7	35	
	chloroethane	1	1	1	0.0007	0.0007	5	0.0035				0.0007	0.0035			
	chloroform	100	1	100	0.4	40	5	200	10	4	20	40	200	4	20	
	1,2 DCB	10	1	10	0.4	4	50	200	100	40	2000	4	200	40	2000	
	1,4 DCB	10	0.2	2	0.4	4	50	200	100	40	2000	0.8	40	8	400	
	Ethyl Benz	10	1	10	0.4	4	50	200	100	40	2000	4	200	40	2000	S
	MBK	1	1	1	0.4	0.4	5	2	1	0.4	2	0.4	2	0.4	2	
	IP Benz.	1000	0.2	200	0.4	400	500	2×10^5	100	40	2×10^4	80	4×10^4	8	4000	
	MeCl	10	1	10	0.0007	0.007	5	0.035	1	0.0007	0.0035	0.0007	0.035	0.0007	0.0035	
	MIBK	100	1	100	0.4	40	5	200	1	0.4	2	40	200	0.4	2	
	Naphtha	100	0.2	20	0.4	40	500	2×10^4	1000	0.4	2×10^5	8	4000	80	4×10^4	S
	~~Methyl~~ PB															
	Styrene	10	1	10	0.4	4	50	200	100	40	2000	4	200	40	2000	

"S" indicates constituents identified in the source

continued

SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET

Site Name: Young Refining Corp. References 3, 6, 7

Sources:

1. HWMU - Surface Imp./"Ponds" 4. 7.
2. 5. 8.
3. 6. 9.

SOURCE	HAZARDOUS SUBSTANCE	TOXICITY	GROUND WATER PATHWAY		SURFACE WATER PATHWAY											
					OVERLAND/FLOOD MIGRATION							GROUND WATER TO SURFACE WATER				
			GW Mobility (HRS Table 3-8)	Tox/ Mobility Value (HRS Table 3-9)	Per (HRS Tables 4-10 and 4-11)	Tox/Per Value (HRS Table 4-12)	Bioac Pot. (HRS Table 4-15)	Tox/ Pers/ Bioac Value (HRS Table 4-16)	Ecotox (HRS Table 4-19)	Ecotox/ Pers (HRS Table 4-20)	Ecotox/ Pers/ Bioacc Value (HRS Table 4-21)	Tox/ Mob/ Pers Value (HRS Table 4-26)	Tox/ Mob/ Pers/ Bioacc Value (HRS Table 4-28)	Ecotox/ Mob/ Pers Value (HRS Table 4-29)	Ecotox/ Mob/ Per/ Bioacc Value (HRS Table 4-30)	
	toluene	10	1	10	0.4	4	50	200	100	40	2000	4	200	40	2000	S
	1,1,1 TCA	1	1	1	0.4	0.4	5	2	10	4	20	0.4	2	4	20	
	1,1,2 TCA	1000	1	1000	0.4	400	50	2×10^4	10	4	200	400	2×10^4	4	200	
	~~1,2,4 TMB~~															
	V Acetate	10	1	10	0.4	4	0.5	2	10	4	2	4	2	4	2	
	~~P~~ xylene	10	1	10	0.4	4	50	200	100	40	2000	4	200	40	2000	
	phenol	1	1	1	1	1	5	5	10,000	10,000	5×10^4	1	5	10,000	5×10^4	
	4-BPPE		0.002		1		5000		1,000	1000	5×10^6			2	1×10^4	
	Di-n-OP	100	2×10^{-7}	2×10^{-5}	1	100	500	5×10^4				2×10^{-5}	0.01			
	Isophorone	10	1	10	1	10	5	50	1	1	5	10	5	1	5	
	2 Me Naph		0.002		0.4		5000		1000	400	2×10^6			400	2×10^6	S
	Vanadium	100	2×10^{-7}	2×10^{-5}	1	100	0.5	50				2×10^{-5}	1×10^{-5}			
	m-xylene	1	1	1	0.4	0.4	500	200	100	40	2×10^4	0.4	200	40	2×10^4	S
	o-xylene	1	1	1	0.4	0.4	50	20	100	40	2000	0.4	20	40	2000	S

"S" indicates constituents identified in the source

GROUND WATER PATHWAY
GROUND WATER USE DESCRIPTION

Describe Ground Water Use within 4 Miles of the Site: Ref. 3, 4, 23
Describe generalized stratigraphy, aquifers, municipal and private wells

Groundwater in this area occurs mainly in the saturated regolith and in discontinuities in the underlying rocks, such as joints, fractures, foliation, and weathered zones. The relatively more permeable regolith serves as a reservoir to trap and channel recharge water into the underlying network of discontinuities in the relatively less permeable bedrock. The orientation of these discontinuities controls groundwater flow directions. Because the regolith and bedrock comprise a single flow system, the "uppermost aquifer" is the only aquifer underlying the site.

Groundwater is typically encountered between 10 and 600 feet below ground surface, and with very few exceptions, is under water table conditions. Yields for wells tend to be relatively small due to the low permeability of the crystalline rocks and overlying regolith, which limits the rate of recharge. For this reason, groundwater in this area is second to surface water for municipal supply. Well yields are highly dependent on well placement and site specific geology, however, and locally may be sufficient for municipal supply.

Most residents within four miles of Young Refining obtain their potable water from the Douglasville/Douglas County Water and Sewer Authority. The Authority gets its water from surface water; Anneewakee Creek and the Bear Creek and Dog River reservoirs. Additional water is purchased fro the Cobb County-Marietta Water Authority on an as-needed basis. However, the CENTRACTS report indicates that about 1358 people within four miles get their water from wells. Some of these people undoubtedly live in the Eastwood, Pine Brook Estates or Lakeside mobile home parks, although the EPD files refer to a private well on Malone Road about 0.8 miles north of the site.

Show Calculations of Ground Water Drinking Water Populations for each Aquifer:
Provide apportionment calculations for blended supply systems.
County average number of persons per household: 2.9 Reference _____

Date 6/16 Time 3:00 ☐AM ☒PM

WHILE YOU WERE OUT

M Ingrid Lennie

of GMA

Phone Numbers

Office 404-688-0472 (Area Code / Number / Ext.)

Voicemail _____

FAX _____

Pager _____

Mobile _____

e-mail _____

☐ Telephoned
☐ Please call
☐ Returned your call
☐ Called to see you
☐ Wants to see you
☐ Will call again
☐ URGENT

Message

The number she found was #2.9 per household.

Georgia Municipal Association

404-688-0472

SI TABLE 4: GROUND WATER OBSERVED RELEASE SUBSTANCES (BY AQUIFER)

Sample ID	Hazardous Substance	Bckgrd. Conc.	Toxicity/ Mobility	References
		Highest Toxicity/Mobility		

SI TABLE 5: GROUND WATER ACTUAL CONTAMINATION TARGETS

Well ID: _____ Level I _____ Level II _____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

Well ID: _____ Level I _____ Level II _____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

From: Sue Grunwald
To: EPD-TT.HAZ.Jim McNamara
Date: 6/14/99 4:18pm
Subject: Douglasville/Douglas County -Reply

Jim, I'll do some further checking, but from what I can find, there are no groundwater systems in Douglas County for which we would be doing any wellhead protection plans.

Sandra, please advise Jim if this is an incorrect statement.

>>> Jim McNamara 06/14/99 02:26pm >>>
Has a wellhead protection area, similar to the one for Fort Valley, been designated for either Douglasville or Douglas County?

CC: Sandra Robertson

GROUND WATER PATHWAY WORKSHEET

LIKELIHOOD OF RELEASE	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to the aquifer, assign a score of 550. Record observed release substances on SI Table 4.	550		
2. POTENTIAL TO RELEASE: Depth to aquifer: _____feet. If sampling data do not support a release to the aquifer, and the site is in karst terrain or the depth to aquifer is 70 feet or less, assign a score of 500; otherwise, assign a score of 340. Optionally, evaluate potential to release according to HRS Section 3.			
LR =	550		

TARGETS			
Are any wells part of a blended system? Yes____ No_____ If yes, attach a page to show apportionment calculations.			
3. ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates that any target drinking water well for the aquifer has been exposed to a hazardous substance from the site, evaluate the factor score for the number of people served (SI Table 5). Level I: _____ people x 10 = _____ Level II: _____ people x 1 = _____ **Total =**	0		
4. POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water wells for the aquifer or overlying aquifers that are not exposed to a hazardous substance from the site; record the population for each distance category in SI Table 6a or 6b. Sum the population values and multiply by 0.1.	17		3
5. NEAREST WELL: Assign a score of 50 for any Level I Actual Contamination Targets for the aquifer or overlying aquifer. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Targets exist, assign the Nearest Well score from SI Table 6a or 6b. If no drinking water wells exist within 4 miles, assign 0.	18		3, 4
6. WELLHEAD PROTECTION AREA (WHPA): If any source lies within or above a WHPA for the aquifer, or if a ground water observed release has occurred within a WHPA, assign a score of 20; assign 5 if neither condition applies but a WHPA is within 4 miles; otherwise assign 0.	0		
7. RESOURCES: Assign a score of 5 if one or more ground water resource applies; assign 0 if none applies. • Irrigation (5 acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Supply for commercial aquaculture • Supply for a major or designated water recreation area, excluding drinking water use	0		4, 17, 18
Sum of Targets T=	35		

SI TABLE 6 (From HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUND WATER TARGET POPULATIONS

SI Table 6a: Other Than Karst Aquifers

Distance from Site	Pop.	Nearest Well (choose highest)	Population Served by Wells within Distance Category												Pop. Value	Ref.
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000		
0 to $\frac{1}{4}$ mile	2	20	(4)	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455	4	
> $\frac{1}{4}$ to $\frac{1}{2}$ mile	18	(18)	2	(11)	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122	11	
> $\frac{1}{2}$ to 1 mile	85	9	1	5	(17)	52	167	523	1,669	5,224	16,684	52,239	166,835	522,385	17	
> 1 to 2 miles	216	5	0.7	3	10	(30)	94	294	939	2,939	9,385	29,384	93,845	293,842	30	
> 2 to 3 miles	379	3	0.5	2	7	21	(68)	212	678	2,122	6,778	21,222	67,777	212,219	68	
>3 to 4 miles	658	2	0.3	1	4	13	(42)	131	417	1,306	4,171	13,060	41,709	130,596	42	
Nearest Well =		18												**Sum =**	172	

SI TABLE 6 (From HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUND WATER TARGET POPULATIONS (continued)

SI Table 6b: Karst Aquifers

Distance from Site	Pop.	Nearest Well (choose highest)	Population Served by Wells within Distance Category												* Pop. Value	Ref.
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000		
0 to $\frac{1}{4}$ mile		20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455		
$>\frac{1}{4}$ to $\frac{1}{2}$ mile		20	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122		
$>\frac{1}{2}$ to 1 mile		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
> 1 to 2 miles		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
> 2 to 3 miles		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
>3 to 4 miles		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		

Nearest Well = | | **Sum =** | |

GROUND WATER PATHWAY WORKSHEET (concluded)

WASTE CHARACTERISTICS	Score	Data Type	Does not Apply
8. If any Actual Contamination Targets exist for the aquifer or overlying aquifers, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if no Actual Contamination Targets exist, assign the hazardous waste quantity score calculated for sources available to migrate to ground water.	100		
9. Assign the highest ground water toxicity/mobility value from SI Table 3 or 4.	10,000		
10. Multiply the ground water toxicity/mobility and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below: (from HRS Table 2-7)			

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 or greater	100

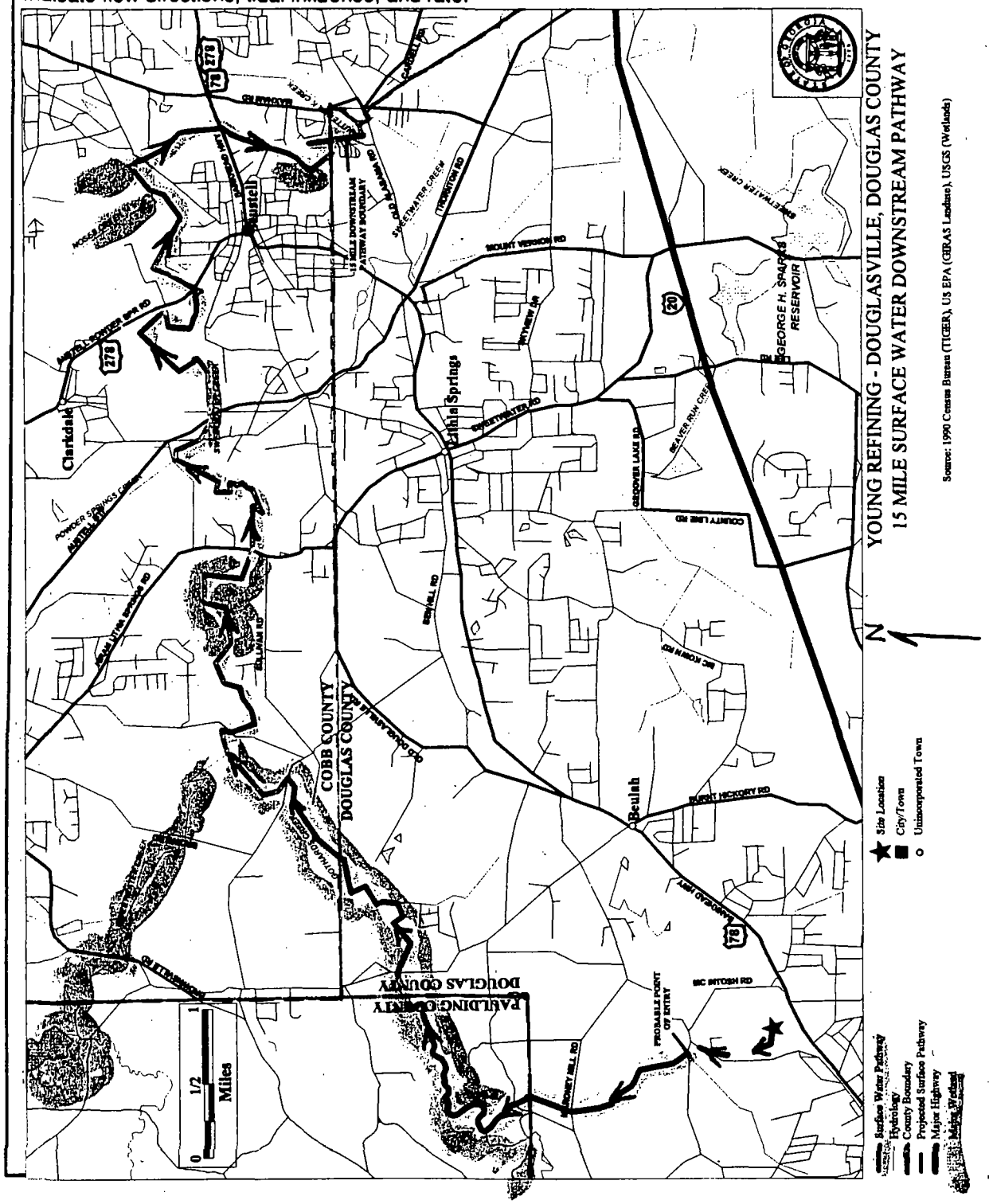
WC = 32

Multiply LR by T and by WC. Divide the product by 82,500 to obtain the ground water pathway score for each aquifer. Select the highest aquifer score. If the pathway score is greater than 100, assign 100.

GROUND WATER PATHWAY SCORE: $\frac{\text{LR X T X WC}}{\text{82,500}}$ = 7.5 (Maximum of 100)

SURFACE WATER PATHWAY

Sketch of the Surface Water Migration Route:
Label all surface water bodies. Include runoff route and drainage direction, probable point of entry, and 15-mile target distance limit. Mark sample locations, intakes, fisheries, and sensitive environments. Indicate flow directions, tidal influence, and rate.



Ref. 19

SURFACE WATER PATHWAY

Surface Water Observed Release Substances Summary Table

On SI Table 7, list the hazardous substances detected in surface water samples for the watershed, which can be attributed to the site. Include only those substances in observed releases (direct observation) or with concentration levels significantly above background levels. Obtain toxicity, persistence, bioaccumulation potential, and ecotoxicity values from SCDM. Enter the highest toxicity/persistence, toxicity/persistence/bioaccumulation, and ecotoxicity/persistence/ecobioaccumulation values in the spaces provided.

- TP = Toxicity x Persistence
- TPB = TP x bioaccumulation
- ETPB = EP x bioaccumulation (EP = ecotoxicity x persistence)

Drinking Water Actual Contamination Targets Summary Table

For an observed release at or beyond a drinking water intake, on SI Table 8 enter each hazardous substance by sample ID and the detected concentration. For surface water sediment samples detecting a hazardous substance at or beyond an intake, evaluate the intake as Level II contamination. Obtain benchmark, cancer risk, and reference dose concentrations for each substance from SCDM. For MCL and MCLG benchmarks, determine the highest percentage of benchmark obtained for any substance. For cancer risk and reference dose, sum the percentages of the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage or the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate the population served by the intake as a Level I target. If the percentages are less than 100% or all are N/A, evaluate the population served by the intake as a Level II target.

SI TABLE 7: SURFACE WATER OBSERVED RELEASE SUBSTANCES

Sample ID	Hazardous Substance	Bckgrd. Conc.	Toxicity/ Persistence	Toxicity/ Persis./ Bioaccum	Ecotoxicity/ Persis/ Ecobioaccum	References
	barium		10,000	5,000	0.5	5
	chromium		10,000	50,000	500	5
⇒	cadmium		10,000	5×10^7	5×10^6	5
	lead		10,000	5×10^5	5×10^6	5
	thallium		100	50,000	500	
	copper				5×10^6	
	nickel		10,000	5,000	5,000	
	silver		100	500	5×10^5	5
	zinc		10	5,000	5,000	
	phenol		1	5	50,000	
	MEK		4	2	0.2	
	trans-1,2 DCE		40	2,000	20	
⇒	bis(2EH) Phth		100	5×10^6	5×10^7	
	acetone		4	2	20	
	benzyl alcohol		4	20	200	
	TCFM		4	200		
	DDT *		1,000	5×10^7	5×10^8	
		Highest Values	10,000	5×10^7	5×10^8	

⇒ 3, 5, 11, 12

* found off-site, not attributable

SI TABLE 8: SURFACE WATER DRINKING WATER ACTUAL CONTAMINATION TARGETS

Intake ID: _____ Sample Type _____ Level I _____ Level II _____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

Intake ID: _____ Sample Type _____ Level I _____ Level II _____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

SURFACE WATER PATHWAY
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET

LIKELIHOOD OF RELEASE– OVERLAND/FLOOD MIGRATION	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7.			
2. POTENTIAL TO RELEASE: Distance to surface water: 2800 (feet) If sampling data do not support a release to surface water in the watershed, use the table below to assign a score from the table below based on distance to surface water and flood frequency.			1, 3, 20, 15

Distance to surface water <2500 feet	500
Distance to surface water >2500 feet, and:	
Site in annual or 10-yr floodplain	500
Site in 100-yr floodplain	400
Site in 500-yr floodplain	300
Site outside 500-yr floodplain	100 ⇐

Optionally, evaluate surface water potential to release according to HRS Section 4.1.2.1.2 — Score: 70

LR = 70

LIKELIHOOD OF RELEASE GROUND WATER TO SURFACE WATER MIGRATION	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7.			
NOTE: Evaluate ground water to surface water migration only for a surface water body that meets all of the following conditions:			
1) A portion of the surface water is within 1 mile of site sources having a containment factor greater than 0.	Not Evaluated		
2) No aquifer discontinuity is established between the source and the above portion of the surface water body.			
3) The top of the uppermost aquifer is at or above the bottom of the surface water.			
Elevation of top of uppermost aquifer _____			
Elevation of bottom of surface water body _____			
2. POTENTIAL TO RELEASE: Use the ground water potential to release. Optionally, evaluate surface water potential to release according to HRS Section 3.1.2.			

LR =

SURFACE WATER PATHWAY
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET (CONTINUED)

DRINKING WATER THREAT TARGETS	Score	Data Type	Refs
Record the water body type, flow, and number of people served by each drinking water intake within the target distance limit in the watershed. If there is no drinking water intake within the target distance limit, assign 0 to factors 3, 4, and 5. Intake Name / Water Body Type / Flow / People Served _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ Are any intakes part of a blended system? Yes _____ No _____ If yes, attach a page to show apportionment calculations. 3. ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates a drinking water intake has been exposed to a hazardous substance from the site, list the intake name and evaluate the factor score for the drinking water population (SI Table 8). _____ , _____ Level I: _____ people x 10 = _____ Level II: _____ people x 1 = _____ **Total =**	0		
4. POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water intakes for the watershed that have not been exposed to a hazardous substance from the site. Assign the population values from SI Table 9. Sum the values and multiply by 0.1.	0		3
5. NEAREST INTAKE: Assign a score of 50 for any Level I Actual Contamination Drinking Water Targets for the watershed. Assign a score of 45 if there are Level II targets for the watershed, but no Level I targets. If no Actual Contamination Drinking Water Targets exist, assign a score for the intake nearest the PPE from SI Table 9. If no drinking water intakes exist, assign 0.	0		3
6. RESOURCES: Assign a score of 5 if one or more surface water resource applies; assign 0 if none applies. • Irrigation (5 acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Major or designated water recreation area, excluding drinking water use	5		21
SUM OF TARGETS T=	5		

HRS Section 4.1.2.1.2

Table 4-3 Drainage Area = 1
less than 50 acres

Table 4-4 Soil Group = D

Table 4-5 Rainfall/Runoff values
2yr/24hr. rainfall 3.5" or greater
based on 1995-1996
factor = 6

Table 4-6 Runoff Factor = 1

Table 4-7 Distance to surface water
2800 ft $\Rightarrow$ factor = 6

TABLE 4-1.—SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

Factor categories and factors	Maximum value	Value assigned
Drinking Water Threat		
Likelihood of Release:		
1. Observed Release	550	___
2. Potential to Release by Overland Flow:		
2a. Containment	10	10
2b. Runoff	25	1
2c. Distance to Surface Water	25	6
2d. Potential to Release by Overland Flow (lines 2a[2b+2c])	500	70
3. Potential to Release by Flood:		
3a. Containment (Flood)	10	10
3b. Flood Frequency	50	0
3c. Potential to Release by Flood (lines 3a×3b)	500	0
4. Potential to Release (lines 2d+3c, subject to a maximum of 500)	500	70
5. Likelihood of Release (higher of lines 1 and 4)	550	___
Waste Characteristics:		
6. Toxicity/Persistence	(a)	___
7. Hazardous Waste Quantity	(a)	___
8. Waste Characteristics	100	___
Targets:		
9. Nearest Intake	50	___
10. Population		
10a. Level I Concentrations	(b)	___
10b. Level II Concentrations	(b)	___
10c. Potential Contamination	(b)	___
10d. Population (lines 10a+10b+10c)	(b)	___
11. Resources	5	___
12. Targets (lines 9+10d+11)	(b)	___
Drinking Water Threat Score:		
13. Drinking Water Threat Score ([lines 5×8×12]/82,500, subject to a maximum of 100)	100	___
Human Food Chain Threat		
Likelihood of Release:		
14. Likelihood of Release (same value as line 5)	550	___
Waste Characteristics:		
15. Toxicity/Persistence/Bioaccumulation	(a)	___
16. Hazardous Waste Quantity	(a)	___
17. Waste Characteristics	1,000	___
Targets:		
18. Food Chain Individual	50	___
19. Population		
19a. Level I Concentrations	(b)	___
19b. Level II Concentrations	(b)	___

SI TABLE 9 (From HRS Table 4-14): DILUTION-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FOR SURFACE WATER MIGRATION PATHWAY

Type of Surface Water Body	Pop.	Nearest Intake	Number of people									Pop. Value
			0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	
Minimal Stream (<10 cfs)		20	0	4	17	53	164	522	1,633	5,214	16,325	
Small to moderate stream (10 to 100 cfs)		2	0	0.4	2	5	16	52	163	521	1,633	
Moderate to large stream (> 100 to 1,000 cfs)		0	0	0.04	0.2	0.5	2	5	16	52	163	
Large Stream to river (>1,000 to 10,000 cfs)		0	0	0.004	0.02	0.05	0.2	0.5	2	5	16	
Large River (> 10,000 to 100,000 cfs)		0	0	0	0.002	0.005	0.02	0.05	0.2	0.5	16	
Very Large River (>100,000 cfs)		0	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	
Shallow ocean zone or Great Lake (depth < 20 feet)		0	0	0	0.002	0.005	0.02	0.05	0.2	0.5	2	
Moderate ocean zone or Great Lake (Depth 20 to 200 feet)		0	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	
Deep ocean zone or Great Lake (depth > 200 feet)		0	0	0	0	0	0.001	0.003	0.008	0.03	0.08	
3-mile mixing zone in quiet flowing river (≥ 10 cfs)		10	0	2	9	26	82	261	817	2,607	8,163	
	Nearest Intake =									Sum =		

References _____

SURFACE WATER PATHWAY

Human Food Chain Actual Contamination Targets Summary Table

On SI Table 10, list the hazardous substances detected in sediment, aqueous, sessile benthic organism tissue, or fish tissue samples (taken from fish caught within the boundaries of the observed release) by sample ID and concentration. Evaluate fisheries within the boundaries of observed releases detected by sediment or aqueous samples as Level II, if at least one observed release substance has a bioaccumulation potential factor value of 500 or greater (see SI Table 7). Obtain benchmark, cancer risk, and reference dose concentrations from SCDM. For FDAAL benchmarks, determine the highest percentage of benchmark obtained for any substance. For cancer risk and reference dose, sum the percentages for the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate this portion of the fishery as subject to Level I concentrations. If the percentages are less than 100% or all are N/A, evaluate the fishery as a Level II target.

Sensitive Environment Actual Contamination Targets Summary Table

On SI Table 11, list each hazardous substance detected in aqueous or sediment samples at or beyond wetlands or a surface water sensitive environment by sample ID. Record the concentration. If contaminated sediments or tissues are detected at or beyond a sensitive environment, evaluate the sensitive environment as Level II. Obtain benchmark concentrations from SCDM. For AWQC/AALAC benchmarks, determine the highest percentage of benchmark of the substances detected in aqueous samples. If benchmark concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage equals or exceeds 100%, evaluate that part of the sensitive environment subject to Level I concentrations. If the percentage is less than 100%, or all are N/A, evaluate the sensitive environment as Level II.

SI TABLE 10: HUMAN FOOD CHAIN ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Fishery ID: _____ Sample Type _____ Level I _____ Level II _____ References _____

Sample ID	Hazardous Substance	Conc. (mg/kg)	Benchmark Concentration (FDAAL)	% of Benchmark	Cancer Risk Concentration.	% of Cancer Risk Concentration	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

SI TABLE 11: SENSITIVE ENVIRONMENT ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Environment ID: _____ Sample Type _____ Level I _____ Level II _____ Environment Value _____

Sample ID	Hazardous Substance	Conc.. (µg/L)	Benchmark Concentration (AWQC or AALAC)	% of Benchmark	References
			Highest Percent		

Environment ID: _____ Sample Type _____ Level I _____ Level II _____ Environment Value _____

Sample ID	Hazardous Substance	Conc.. (µg/L)	Benchmark Concentration (AWQC or AALAC)	% of Benchmark	References
			Highest Percent		

SURFACE WATER PATHWAY (continued)
HUMAN FOOD CHAIN THREAT WORKSHEET

HUMAN FOOD CHAIN THREAT TARGETS	Score	Data Type	Refs

Record the water body type and flow for each fishery within the target distance limit. If there is no fishery within the target distance limit, assign a score of 0 at the bottom of this page.

Fishery Name_____ Water Body_____ Flow_____cfs

Species_____ Production_____lbs/yr
Species_____ Production_____lbs/yr

Fishery Name_____ Water Body Gothard's Creek Flow_____cfs

Species_____ Production_____lbs/yr
Species_____ Production_____lbs/yr

Fishery Name_____ Water Body Sweetwater Creek Flow 310 cfs

Species_____ Production_____lbs/yr
Species_____ Production_____lbs/yr

FOOD CHAIN INDIVIDUAL

7. ACTUAL CONTAMINATION FISHERIES:

If analytical evidence indicates that a fishery has been exposed to a hazardous substance with a bioaccumulation factor greater than or equal to 500 (SI Table 10), assign a score of 50 if there is a Level I fishery. Assign 45 if there is a Level II fishery, but no Level I fishery.

8. POTENTIAL CONTAMINATION FISHERIES:

If there is a release of a substance with a bioaccumulation factor greater than or equal to 500 to a watershed containing fisheries within the target distance limit, but there are no Level I or Level II fisheries, assign a score of 20. 12

If there is no observed release to the watershed, assign a value for potential contamination fisheries from the table below using the lowest flow at all fisheries within the target distance limit:

Lowest Flow	FCI Value
<10 cfs	20
10 to 100 cfs	2
>100 cfs, coastal tidal waters, oceans, or Great Lakes	0
3-mile mixing zone in quiet flowing river	10

FCI Value = 20 12

SUM OF TARGETS T = 20

SURFACE WATER PATHWAY (continued)
ENVIRONMENTAL THREAT WORKSHEET

When measuring length of wetlands that are located on both sides of a surface water body, sum both frontage lengths. For a sensitive environment that is more than one type, assign a value for each type.

ENVIRONMENTAL THREAT TARGETS — Score | Data Type | Refs

Record the water body type and flow for each surface water sensitive environment within the target distance (see SI Table 12). If there is no sensitive environment within the target distance limit, assign a score of 0 at the bottom of the page.

Environment Name	Water Body Type	Flow
		cfs
		cfs
		cfs
		cfs
		cfs

9. ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS: If sampling data or direct observation indicate any sensitive environment has been exposed to a hazardous substance from the site, record this information on SI Table 11, and assign a factor value for the environment (SI Tables 13 and 14).

Environment Name	Environment Type and Value (SI Tables 13 & 14)	Multiplier (10 for Level I, 1 for Level II)	Product
		x =	
		x =	
		x =	
		x =	
		Sum =	

10. POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS:

Flow	Dilution Weight (SI Table 12)	Environment Type and Value (SI Tables 13 & 14)	Pot. Cont.	Product
<100 cfs	0.1 x	12-16mi Wetlands (350) x	0.1 =	3.5
<100 cfs	0.1 x	State Threatened (50) x	0.1 =	.5
310 cfs	0.01 x	State threatened (50) x	0.1 =	.05
310 cfs	0.01 x	12-16mi Wetlands (350) x	0.1 =	.35
cfs	x	x	0.1 =	
			Sum =	

T = 4.4

13, 14, 16, 22

SI TABLE 12 (HRS Table 4-13): SURFACE WATER DILUTION WEIGHTS

Type of Surface Water Body		Assigned Dilution Weight
Descriptor	**Flow Characteristics**	
Minimal stream	< 10 cfs	1
Small to moderate stream	10 to 100 cfs	0.1
Moderate to large stream	> 100 to 1,000 cfs	0.01
Large stream to river	> 1,000 to 10,000 cfs	0.001
Large river	> 10,000 to 100,000 cfs	0.0001
Very large river	> 100,000 cfs	0.00001
Coastal tidal waters	Flow not applicable; depth not applicable	0.001
Shallow ocean zone or Great Lake	Flow not applicable; depth less than 20 feet	0.001
Moderate depth ocean zone or Great Lake	Flow not applicable; depth 20 to 200 feet	0.0001
Deep ocean zone or Great Lake	Flow not applicable; depth greater than 200 feet	0.000005
3-mile mixing zone in quiet flowing river	10 cfs or greater	0.5

craker creek - app. 26 cfs.
Gothards Creek - small to moderate stream
Sweetwater Creek - 310 cfs

Georgia Department of Natural Resources

205 Butler Street, S.E., East Floyd Tower, Atlanta, Georgia 30334
Lonice C. Barrett, Commissioner
Harold F. Reheis, Director
Environmental Protection Division
(404) 656-4713

Reply To:
Hazardous Waste Management Branch
Floyd Towers East, Suite 1154
205 Butler Street, SE
Atlanta, Georgia 30334
(404) 656-7802

MEMORANDUM

TO: Jim McNamara
Environmental Program Manager I

FROM: Earl A. Shapiro
Advanced Geologist

DATE: October 25, 1999

SUBJECT: Young Refining: Cracker Creek

The stream flow at Cracker Creek, the first order stream adjacent to Young Refining site, is 2.6 (+/- 0.1) cubic feet per second.
This figure was derived using the U.S. Geologic Survey methodology based on drainage basin area.

SI TABLE 13 (HRS TABLE 4-23): SURFACE WATER AND AIR SENSITIVE ENVIRONMENTS VALUES

SENSITIVE ENVIRONMENT	*ASSIGNED VALUE*
Critical habitat for Federal designated endangered or threatened species Marine Sanctuary National Park Designated Federal Wilderness Area Ecologically important areas identified under the Coastal Zone Wilderness Act Sensitive Areas identified under the National Estuary Program or Near Coastal Water Program of the Clean Water Act Critical Areas identified under the Clean Lakes Program of the Clean Water Act (subareas in lakes or entire small lakes) National Monument (air pathway only) National Seashore Recreation Area National Lakeshore Recreation Area	100
Habitat known to be used by Federal designated or proposed endangered or threatened species National Preserve National or State Wildlife Refuge Unit of Coastal Barrier Resources System Coastal Barrier (undeveloped) Federal land designated for the protection of natural ecosystems Administratively Proposed Federal Wilderness Area Spawning areas critical for the maintenance of fish/shellfish species within a river system, bay, or estuary Migratory pathways and feeding areas critical for the maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which the fish spend extended periods of time Terrestrial areas utilized by large or dense aggregations of vertebrate animals (semi-aquatic foragers) for breeding National river reach designated as recreational	75
Habitat known to be used by State designated endangered or threatened species Habitat known to be used by a species under review as to its Federal endangered or threatened status Coastal Barrier (partially developed) Federally designated Scenic or Wild River	50
State land designated for wildlife or game management State designated Scenic or Wild River State designated Natural Area Particular areas, relatively small in size, important to maintenance of unique biotic communities	25
State designated areas for the protection of maintenance of aquatic life under the Clean Water Act	5
Wetlands — See SI Table 14 (Surface Water Pathway) or SI Table 23 (Air Pathway)	

SI TABLE 14 (HRS TABLE 4-24): SURFACE WATER WETLANDS FRONTAGE VALUES

Total Length of Wetlands	Assigned Value
Less than 0.1 mile	0
0.1 to 1 mile	25
Greater than 1 to 2 miles	50
Greater than 2 to 3 miles	75
Greater than 3 to 4 miles	100
Greater than 4 to 8 miles	150
Greater than 8 to 12 miles	250
Greater than 12 to 16 miles	350
Greater than 16 to 20 miles	450
Greater than 20 miles	500

SURFACE WATER PATHWAY (concluded)
WASTE CHARACTERISTICS, THREAT, AND PATHWAY SCORE SUMMARY

WASTE CHARACTERISTICS

		Score
14.	If an Actual Contamination Target (drinking water, human food chain, or environmental threat) exists for the watershed, assign the calculated hazardous waste quantity score, or a score of 100, whichever is greater.	100
15.	Assign the highest value from SI Table 7 (observed release) or SI Table 3 (no observed release) for the hazardous substance waste characterization factors below. Multiply each by the surface water hazardous waste quantity score and determine the waste characteristics score for each threat.	

	Substance Value		HWQ		Product	WC Score (From Table) (Maximum of 100)
Drinking Water Threat Toxicity/Persistence	$10,000$	x	100	=	1×10^6	32
Food Chain Threat Toxicity/Persistence/ Bioaccumulation	5×10^7	x	100	=	5×10^9	180
Environmental Threat Ecotoxicity/Persistence/ Ecobioaccumulation	5×10^7	x	100	=	5×10^9	180

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 to <1E + 09	100
1E + 09 ~~or greater~~ 10	~~1000~~ 180

10 - 11 → 320

Product	WC SCORE
11 - 12	560
12 - greater	1000

SURFACE WATER PATHWAY THREAT SCORES

Threat	Likelihood of Release (LR) Score	Targets (T) Score	Pathway Waste Characteristics (WC) Score (determined above)	Threat Score $\frac{LR \times T \times WC}{82,500}$
Drinking Water	70	5	32	(maximum of 100) 0.14
Human Food Chain	70	20	180	(maximum of 100) 3.05
Environmental	70	4.4	180	(maximum of 60) 0.67

SURFACE WATER PATHWAY SCORE (Drinking Water Threat + Human Food Chain Threat + Environmental Threat)

(maximum of 100) 3.86

SOIL EXPOSURE PATHWAY

If there is no observed contamination (e.g., ground water plume with no known surface source), do not evaluate the soil exposure pathway. Discuss evidence for no soil exposure pathway.

Soil Exposure Resident Population Targets Summary

For each property (duplicate page 35 as necessary):

If there is an area of observed contamination on the property and within 200 feet of a residence, school, or day care center, enter on Table 15 each hazardous substance by sample ID. Record the detected concentration. Obtain cancer risk, and reference dose concentrations from SCDM. Sum the cancer risk and reference dose percentages for the substances listed. If cancer risk or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate the residents and students as Level I. If both percentages are less than 100% or all are N/A, evaluate the targets as Level II.

SI TABLE 15: SOIL EXPOSURE RESIDENT POPULATION TARGETS

Residence ID: ______________________ Level I ______ Level II _____ Population ______________________

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Highest Percent		Sum of Percents		Sum of Percents	

Residence ID: ______________________ Level I ______ Level II _____ Population ______________________

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Highest Percent		Sum of Percents		Sum of Percents	

Residence ID: ______________________ Level I ______ Level II _____ Population ______________________

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Highest Percent		Sum of Percents		Sum of Percents	

SOIL EXPOSURE PATHWAY WORKSHEET
RESIDENT POPULATION THREAT

LIKELIHOOD OF EXPOSURE	Score	Data Type	Refs
1. OBSERVED CONTAMINATION: If evidence indicates presence of observed contamination (depth of 2 feet or less), assign a score of 550; otherwise, assign a 0. Note that a likelihood of exposure score of 0 results in a soil exposure pathway score of 0.			3,4, 5,8
LE =	550		

TARGETS

2. RESIDENT POPULATION: Determine the number of people occupying residences or attending school or day care on or within 200 feet of areas of observed contamination (HRS section 5.1.3). Level I: 0 people x 10 = 0 Level II: 0 people x 1 = 0 **Sum =**	0		3,4 8,
3. RESIDENT INDIVIDUAL: Assign a score of 50 if any Level I resident population exists. Assign a score of 45 if there are Level II targets but no Level I targets. If no resident population exists (*i.e.*, no Level I or Level II targets), assign 0 (HRS Section 5.1.3).	0		3,4, 8
4. WORKERS: Assign a score from the table below for the total number of workers at the site and nearby facilities with areas of observed contamination associated with the site.	5		17
5. TERRESTRIAL SENSITIVE ENVIRONMENTS: Assign a value for each terrestrial sensitive environment (SI Table 16) in an area of observed contamination. **Sum =**	0		16
6. RESOURCES: Assign a score of 5 if any one or more of the following resources is present on an area of observed contamination at the site; assign 0 if none applies. • Commercial agriculture • Commercial silviculture • Commercial livestock production or commercial livestock grazing	0		17, 18, 8
Total of Targets T=	5		

Number of Workers	Score
0	0
1 to 100	5
101 to 1,000	10
>1,000	15

Terrestrial Sensitive Environment Type	Value

SI TABLE 16 (HRS TABLE 5-5): SOIL EXPOSURE PATHWAY TERRESTRIAL SENSITIVE ENVIRONMENT VALUES

TERRESTRIAL SENSITIVE ENVIRONMENT	*ASSIGNED VALUE*
Terrestrial critical habitat for Federal designated endangered or threatened species National Park Designated Federal Wilderness Area National Monument	100
Terrestrial habitat known to be used by Federal designated or proposed threatened or endangered species National Preserve (terrestrial) National or State terrestrial Wildlife Refuge Federal land designated for protection of natural ecosystems Administratively proposed Federal Wilderness Area Terrestrial areas utilized by large or dense aggregations of animals (vertebrate species) for breeding	75
Terrestrial habitat used by State designated endangered or threatened species Terrestrial habitat used by species under review for Federal designated endangered or threatened status	50
State lands designated for wildlife or game management State designated Natural Areas Particular areas, relatively small in size, important to maintenance of unique biotic communities	25

SOIL EXPOSURE PATHWAY WORKSHEET
NEARBY POPULATION THREAT

LIKELIHOOD OF EXPOSURE		Score	Data Type	Ref.
7. Attractiveness/Accessibility (from SI Table 17 or HRS Table 5-6)	Value 10			3, 4, 5
Area of Contamination (from SI Table 18 or HRS Table 5-7)	Value 20			
Likelihood of Exposure (from SI Table 19 or HRS Table 5-8)				
	LE =	5		

TARGETS	Score	Data Type	Ref.
8. Assign a score of 0 if Level I or Level II resident individual has been evaluated or if no individuals live within 1/4 mile travel distance of an area of observed contamination. Assign a score of 1 if nearby population is within 1/4 mile travel distance and no Level I or Level II resident population has been evaluated.	1		3, 8
9. Determine the population within 1 mile travel distance that is not exposed to a hazardous substance from the site (*i.e.*, properties that are not determined to be Level I or Level II); record the population for each distance category in SI Table 20 (HRS Table 5-10). Sum the population values and multiply by 0.1.	2.1		3
T =	3.1		

SI TABLE 17 (HRS TABLE 5-6): ATTRACTIVENESS/ACCESSIBILITY VALUES

Area of Observed Contamination	Assigned Value
Designated recreational area	100
Regularly used for public recreation (for example, vacant lots in urban area)	75
Accessible and unique recreational area (for example, vacant lots in urban area)	75
Moderately accessible (may have some access improvements–for example, gravel road) with some public recreation use	50
Slightly accessible (for example, extremely rural area with no road improvement) with some public recreation use	25
Accessible with no public recreation use	10
Surrounded by maintained fence or combination of maintained fence and natural barriers	5
Physically inaccessible to public, with no evidence of public recreation use	0

SI TABLE 18 (HRS TABLE 5-7): AREA OF CONTAMINATION FACTOR VALUES

Total area of the areas of observed contamination (square feet)	Assigned Value
≤ to 5,000	5
> 5,000 to 125,000	20
> 125,000 to 250,000	40
> 250,000 to 375,000	60
> 375,000 to 500,000	80
> 500,000	100

SI TABLE 19 (HRS TABLE 5-8): NEARBY POPULATION LIKELIHOOD OF EXPOSURE FACTOR VALUES

AREA OF CONTAMINATION FACTOR VALUE	ATTRACTIVENESS/ACCESSIBILITY FACTOR VALUE						
	100	75	50	25	10	5	0
100	500	500	375	250	125	50	0
80	500	375	250	125	50	25	0
60	375	250	125	50	25	5	0
40	250	125	50	25	5	5	0
20	125	50	25	5	5	5	0
5	50	25	5	5	5	5	0

SI TABLE 20 (HRS TABLE 5-10): DISTANCE-WEIGHTED POPULATION VALUES FOR NEARBY POPULATION THREAT

Travel Distance Category (miles)	Pop.	Number of people within the travel distance category												Pop. Value
		0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,001	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	
Greater than 0 to $\frac{1}{4}$	120	0	0.1	0.4	1.0	4	13	41	130	408	1,303	4,081	13,034	4
Greater than $\frac{1}{4}$ to $\frac{1}{2}$	541	0	0.05	0.2	0.7	2	7	20	65	204	652	2,041	6,517	7
Greater than $\frac{1}{2}$ to 1	2223	0	0.02	0.1	0.3	1	3	10	33	102	326	1,020	3,258	10

Reference(s) 3 Sum = 21

SOIL EXPOSURE PATHWAY WORKSHEET (concluded)

WASTE CHARACTERISTICS

10.	Assign the hazardous waste quantity score calculated for soil exposure	100
11.	Assign the highest toxicity value from SI Table 16 Cr, Pb, Cd, Ba	10,000
12.	Multiply the toxicity and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:	WC = 32

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 or greater	100

RESIDENT POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 1;
Targets = Sum of Questions 2, 3, 4, 5, 6)

$$\frac{LE \times T \times WC}{82{,}500}$$

1.1

NEARBY POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 7;
Targets = Sum of Questions 8, 9)

$$\frac{LE \times T \times WC}{82{,}500}$$

0.2

SOIL EXPOSURE PATHWAY SCORE:
Resident Population Threat + Nearby Population Threat

1.3
(Maximum of 100)

AIR PATHWAY

Air Pathway Observed Substances Summary Table

On SI Table 21, list the hazardous substances detected in air samples of a release from the site. Include only those substances with concentrations significantly greater than background levels. Obtain benchmark, cancer risk, and reference dose concentrations from SCDM. For NAAQS/NESHAPS benchmarks, determine the highest percentage of benchmark obtained for any substance. For cancer risk and reference dose, sum the percentages for the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage or the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate targets in the distance category from which the sample was taken and any closer distance categories as Level I. If the percentages are less than 100% or all are N/A, evaluate targets in that distance category and any closer distance categories that are not Level I as Level II.

SI TABLE 21: AIR PATHWAY OBSERVED RELEASE SUBSTANCES

Sample ID: _____ Level I _____ Level II _____ Distance from Sources (mi) ____ References_____

Hazardous Substance	Conc. (µg/m³)	Gaseous Particulate	Benchmark Conc. (NAAQS or NESHAPS)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
	Highest Toxicity/ Mobility		Highest Percent		Sum of Percents		Sum of Percents	

Sample ID: _____ Level I _____ Level II _____ Distance from Sources (mi) ____ References_____

Hazardous Substance	Conc. (µg/m³)	Toxicity/ Mobility	Benchmark Conc. (NAAQS or NESHAPS)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
	Highest Toxicity/ Mobility		Highest Percent		Sum of Percents		Sum of Percents	

Sample ID: _____ Level I _____ Level II _____ Distance from Sources (mi) ____ References_____

Hazardous Substance	Conc. (µg/m³)	Toxicity/ Mobility	Benchmark Conc. (NAAQS or NESHAPS)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
	Highest Toxicity/ Mobility		Highest Percent		Sum of Percents		Sum of Percents	

* Sum the population values and multiply by 0.1.

AIR PATHWAY WORKSHEET

LIKELIHOOD OF RELEASE	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to air, assign a score of 550. Record observed release substances on SI Table 21			
2. POTENTIAL TO RELEASE: If sampling data do not support a release to air, assign a score of 500. Optionally, evaluate air migration gaseous and particulate potential to release (HRS Section 6.1.2)	450		3,8
LR =	450		

TARGETS

3. ACTUAL CONTAMINATION POPULATION: Determine the number of people within the target distance limit subject to exposure from a release of a hazardous substance to the air. a) Level I: _____ people x 10 = _____ b) Level II: _____ people x 1 = _____ **Total =**	0		3
4. POTENTIAL TARGET POPULATION: Determine the number of people within the target distance limit not subject to exposure from a release of a hazardous substance to the air, and assign the total population score from SI Table 22.*	22		3
5. NEAREST INDIVIDUAL: Assign a score of 50 if there are any Level I targets. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Population exists, assign the Nearest Individual score from SI Table 22.	20		3
6. ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS: Sum the sensitive environment values (SI Table 13) and wetland acreage values (SI Table 23) for environments subject to exposure from the release of a hazardous substance to the air.	0		8,16
7. POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS: Use SI Table 24 to evaluate sensitive environments not subject to exposure from a release.	7,52		
8. RESOURCES: Assign a score of 5 if one or more air resources applies within 1/2 mile of a source; assign a 0 if none applies • Commercial agriculture • Commercial silviculture • Major or designated recreation area	5		8
T =	54,52		

Sensitive Environment Type	*Value*
Wetland Acreage	*Value*

TABLE 6-8.—PARTICULATE POTENTIAL TO RELEASE EVALUATION

Source	Source type [a]	Particulate containment factor value [b]	Particulate type factor value [c]	Particulate migration potential factor value [d]	Sum	Particulate source value
		A	B	C	(B+C)	A (B+C)
1. Ponds	cont. soil	10	22	6	28	280
2.						
3.						
4.						
5.						
6.						
7.						
8.						
Particulate Potential to Release Factor Value (Select Highest Particulate Source Value)						280

[a] Enter a Source Type listed in Table 6-4.
[b] Enter Particulate Containment Factor Value from section 6.1.2.2.1.
[c] Enter Particulate Source Type Factor Value from section 6.1.2.2.2.
[d] Enter Particulate Migration Potential Factor Value from section 6.1.2.2.3.

nb – source evaluated this way because it consists of 4 ponds w/ contaminated soils on their banks.

TABLE 6-2.—GAS POTENTIAL TO RELEASE EVALUATION

Source	Source type [a]	Gas containment factor value [b]	Gas source type factor value [c]	Gas migration potential factor value [d]	Sum	Gas source value
		A	B	C	(B+C)	A(B+C)
1. Ponds	surface impnd.	10	28	17	45	450
2.						
3.						
4.						
5.						
6.						
7.						
8.						
Gas Potential to Release Factor (Select the Highest Gas Source Value)						450

[a] Enter a Source Type listed in Table 6-4.
[b] Enter Gas Containment Factor Value from section 6.1.2.1.1.
[c] Enter Gas Source Type Factor Value from section 6.1.2.1.2.
[d] Enter Gas Migration Potential Factor Value from section 6.1.2.1.3.

SI TABLE 22 (From HRS TABLE 6-17): VALUES FOR POTENTIAL CONTAMINATION AIR TARGET POPULATIONS

Distance from Site	Pop.	Nearest Individual (choose highest)	Number of People within the Distance Category												Pop. Value
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000	
On a source	46	(20)	4	17	(53)	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455	53
0 to $\frac{1}{4}$ mile	120	*	1	4	13	(41)	131	408	1,304	4,081	13,034	40,812	130,340	408,114	41
$>\frac{1}{4}$ to $\frac{1}{2}$ mile	541	2	0.2	0.9	3	9	(28)	88	282	882	2,815	8,815	28,153	88,153	28
$>\frac{1}{2}$ to 1 mile	2223	1	0.06	0.3	0.9	3	8	(26)	83	261	834	2,612	8,342	26,119	26
> 1 to 2 miles	7404	0	0.02	0.09	0.3	0.8	3	8	(27)	83	266	833	2,659	8,326	27
> 2 to 3 miles	9261	0	0.009	0.04	0.1	0.4	1	4	(12)	38	120	375	1,199	3,755	12
>3 to 4 miles	12709	0	0.005	0.02	0.07	0.2	0.7	2	7	(28)	73	229	730	2,285	28
Nearest Individual =		20												**Sum =**	215

References 3

* Score = 20 if the Nearest Individual is within $\frac{1}{8}$ mile of a source; score = 7 if the Nearest Individual is between $\frac{1}{8}$ and $\frac{1}{4}$ mile of a source.

SI TABLE 23 (HRS TABLE 6-18): AIR PATHWAY VALUES FOR WETLAND AREA

Wetland Area	Assigned Value
< 1 acre	0
1 to 50 acres	25
> 50 to 100 acres	75
> 100 to 150 acres	125
> 150 to 200 acres	175
> 200 to 300 acres	250
> 300 to 400 acres	350
> 400 to 500 acres	450
> 500 acres	500

SI TABLE 24: DISTANCE WEIGHTS AND CALCULATIONS FOR AIR PATHWAY POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS

Distance	Distance Weight	Sensitive Environment Type and Value (from SI Tables 13 and 20)	Product	
On a Source	0.10	x wetlands (≥ 1 acre)	2.5	
		x		
0 to 1/4 mile	0.025	x wetlands (≥ 5 acre)	.625	3.75
		x State threatened (50)	1.25	
		x Fed. " (75)	1.875	
1/4 to 1/2 mile	0.0054	x wetlands (≥ 5 acre)	.135	.81
		x state threatened (50)	.27	
		x Fed. " (75)	.405	
1/2 to 1 mile	0.0016	x wetlands (< 50 acres)	.04	.24
		x state threatened (50)	.08	
		x Fed. " (75)	.12	
1 to 2 miles	0.0005	x wetlands (< 100 acres)	.0375	.1
		x state threatened (50)	.025	
		x Fed. " (75)	.0375	
2 to 3 miles	0.00023	x wetlands (< 300 acres)	.0575	.08625
		x state threatened (50)	.0115	
		x Fed. " (75)	.01725	
3 to 4 miles	0.00014	x wetlands (< 150 acres)	.0175	.035
		x state threatened (50)	.007	
		x Fed. " (75)	.0105	
> 4 miles	0	x		
			Total Environments Score =	7.52

State/Fed. [redacted]
Threatened species assumed in all of county where they have been sighted (Conservative Assumption)

SITE SCORE CALCULATION	S	S^2
GROUND WATER PATHWAY SCORE (S_{GW})	7.5	56.25
SURFACE WATER PATHWAY SCORE (S_{SW})	3.86	14.9
SOIL EXPOSURE (S_S)	1.3	1.69
AIR PATHWAY SCORE (S_A)	2.97	8.82
SITE SCORE $\sqrt{\frac{S_{GW}^2+S_{SW}^2+S_S^2+S_A^2}{4}}$ =		4.52

COMMENTS

Uncertainties that bias the score low

1) the 1-2 and 2-3 mi population values. Douglas County is part of the Atlanta metroplex, the fastest growing part of the nation; CENTRACTS is based on the census and is 10 yrs. out of date.
2) there may be here-to-fore unidentified sources on site or groundwater users

Uncertainties that bias the score high

1) Conservative assumptions regarding
   - groundwater constituents (highest tox. values not necessarily attributable to site)
   - threatened/endangered species range

AIR PATHWAY (concluded)

WASTE CHARACTERISTICS

9.	If any Actual Contamination Targets exist for the air pathway, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if there are no Actual Contamination Targets for the air pathway, assign the calculated HWQ score for sources available to air migration.	100
10.	Assign the highest air toxicity/mobility value from SI Table 21. benzene has the highest source air Tox/Mob	100
11.	Multiply the air pathway toxicity/mobility and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:	WC = 10

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 or greater	100

AIR PATHWAY SCORE: $\frac{LE \times T \times WC}{82,500}$ = 2.97 (maximum of 100)